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LEAHEY (UPPER) RESERV. (U) CORPS OF ENGINEERS WALTHAM
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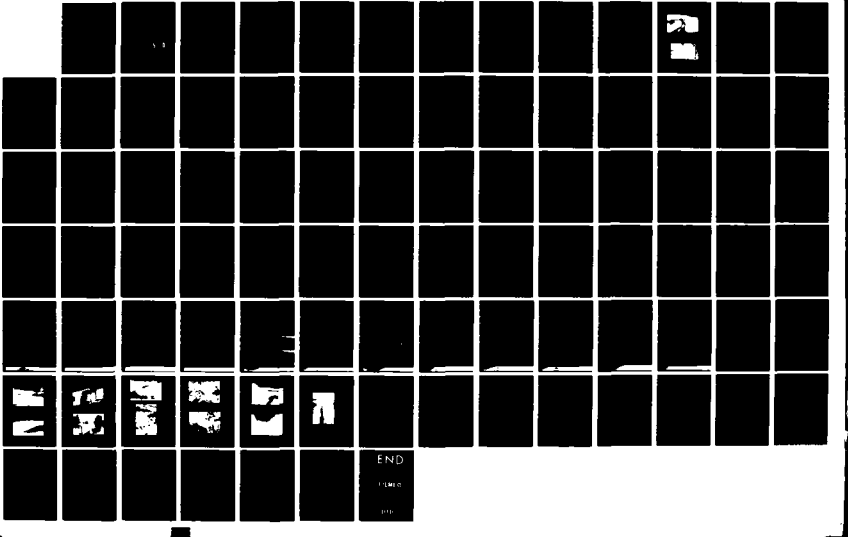
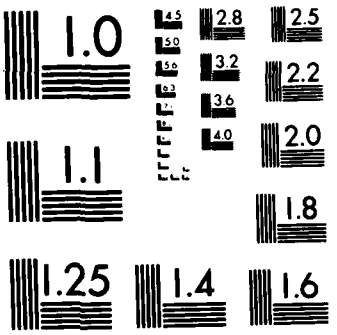
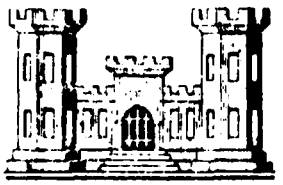




HOUSATONIC RIVER BASIN
LEE, MASSACHUSETTS

LEAHEY (UPPER) RESERVOIR DAM
MA 00265

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM



DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

FEBRUARY 1979

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

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Cover program reads: Phase I Inspection Report, National Dam Inspection Program; however, the official title of the program is: National Program for Inspection of Non-Federal Dams; use cover date for date of report.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

DAMS, INSPECTION, DAM SAFETY,

Housatonic River Basin
Lee, Massachusetts
Codding Brook

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The dam is an earthen dam about 610 ft. long and 56 ft. high. The dam is in good condition. Some seepage was observed. The dam is intermediate in size and had a hazard classification of high. An investigation is recommended to determine the source(s) and extent of seepage occcuring at the downstream toe.

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DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02154

REPLY TO
ATTENTION OF:
NEDED

JUN 06 1979

Honorable Edward J. King
Governor of the Commonwealth of
Massachusetts
State House
Boston, Massachusetts 02133

Dear Governor King:

I am forwarding to you a copy of the Leahey (Upper) Reservoir Dam Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. This report is presented for your use and is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. A brief assessment is included at the beginning of the report. I have approved the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is a vitally important part of this program.

A copy of this report has been forwarded to the Department of Environmental Quality Engineering, the cooperating agency for the Commonwealth of Massachusetts. In addition, a copy of the report has also been furnished the owner, Mr. Peter J. Scohforo, Supt. Dept. of Public Works, Airoldi Building, Railroad Street, Lee, Massachusetts 02138.

Copies of this report will be made available to the public, upon request, by this office under the Freedom of Information Act. In the case of this report the release date will be thirty days from the date of this letter.

I wish to take this opportunity to thank you and the Department of Environmental Quality Engineering for your cooperation in carrying out this program.

Sincerely yours,

JOHN P. CHANDLER
Colonel, Corps of Engineers
Division Engineer

Incl
As stated

LEAHEY (UPPER) RESERVOIR DAM
MA 00265

HOUSTANIC RIVER BASIN
LEE, MASSACHUSETTS

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

Identification No.: MA 00265
Name of Dam: LEAHEY (UPPER) RESERVOIR
Town: LEE
County and State: BERKSHIRE COUNTY, MA
Stream: CODDING BROOK
Date of Inspection: 7 SEPTEMBER 1978

BRIEF ASSESSMENT

Leahey (Upper) Reservoir Dam is an earthen dam approximately 610 feet long and 56 feet high. The dam, which was constructed in 1965, impounds the waters of Codding Brook for water supply to the Town of Lee, MA. The water intakes are controlled at a gatehouse located on the upstream face of the dam. The spillway is approximately 1,000 feet from the left abutment of the dam. It is formed by a trapezoidal earth and rock cut approximately 85 feet wide at the invert and 400 feet long with a low concrete weir approximately 150 feet from the entrance of the spillway channel. Flow from the spillway goes into Commons Brook which joins Codding Brook.

The dam is in good condition. The reservoir water level was approximately 8 feet below spillway crest during the site examination, preventing observation of the dam under the condition of full hydrostatic head. While some seepage was observed, the lower part of the downstream slope of the embankment is heavily covered with vegetation, possibly obscuring the extent of seepage.

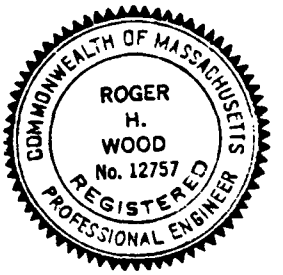
Based on the size classification, intermediate, and hazard classification, high, in accordance with the Corps of Engineers guidelines, the spillway test flood is the Probable Maximum Flood (PMF). Hydraulic analysis indicates that the spillway can safely pass the test flood of 1,510 cfs with a reservoir stage approximately 4.3 feet below top of dam. Maximum spillway capacity is estimated to be 5,420 cfs.

An investigation is recommended to determine the source(s) and extent of seepage occurring at the downstream toe. The seepage has been reported to be present since the construction period when it was first noted. Recommendations for remedial work at this facility include the clearing of trees and brush from the lowest part of the dam's downstream slope, the clearing of brush from the spillway, the filling of the wheel ruts in the crest of the dam, the replacement of lost riprap and the recording on a regular basis of water levels in the observation wells. The remedial work and recommendation delineated in Section 7 should be performed within two years of receipt of the report by the Owner.

CAMP DRESSER AND McKEE INC.

Roger H. Wood

Roger H. Wood
Vice President



This Phase I Inspection Report on Leahey (Upper) Reservoir Dam has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgment and practice, and is hereby submitted for approval.

Joseph A. McElroy

JOSEPH A. MCELROY, MEMBER
Foundation & Materials Branch
Engineering Division

Carney M. Terzian

CARNEY M. TERZIAN, MEMBER
Design Branch
Engineering Division

Joseph W. Finegan, Jr.

JOSEPH W. FINEGAN, JR., CHAIRMAN
Chief, Reservoir Control Center
Water Control Branch
Engineering Division

APPROVAL RECOMMENDED:

Joe B. Fryar

JOE B. FRYAR
Chief, Engineering Division

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I Investigations are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the test flood is based on the estimated "probable maximum flood" for the region (greatest reasonably possible storm runoff), or a fraction thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

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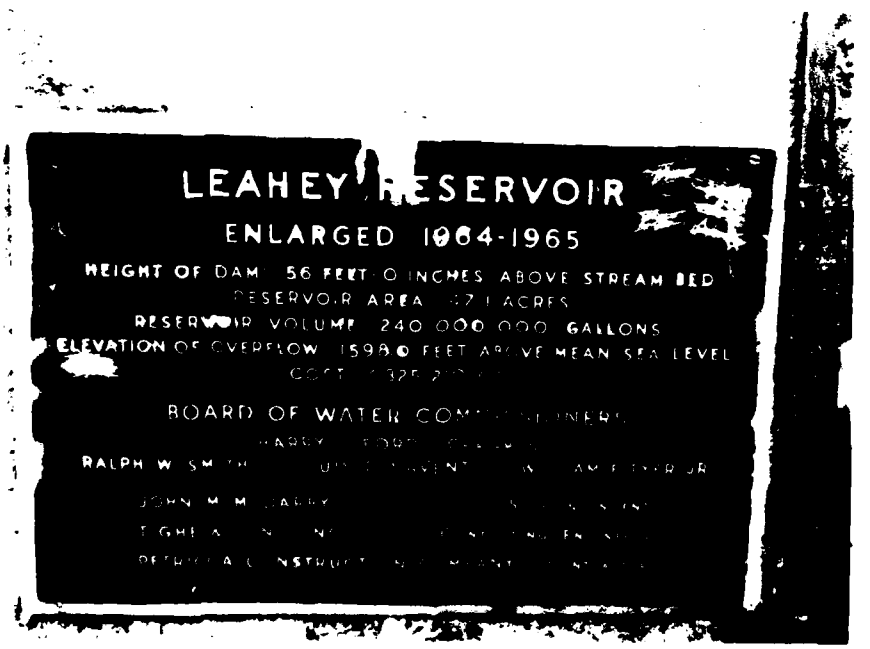
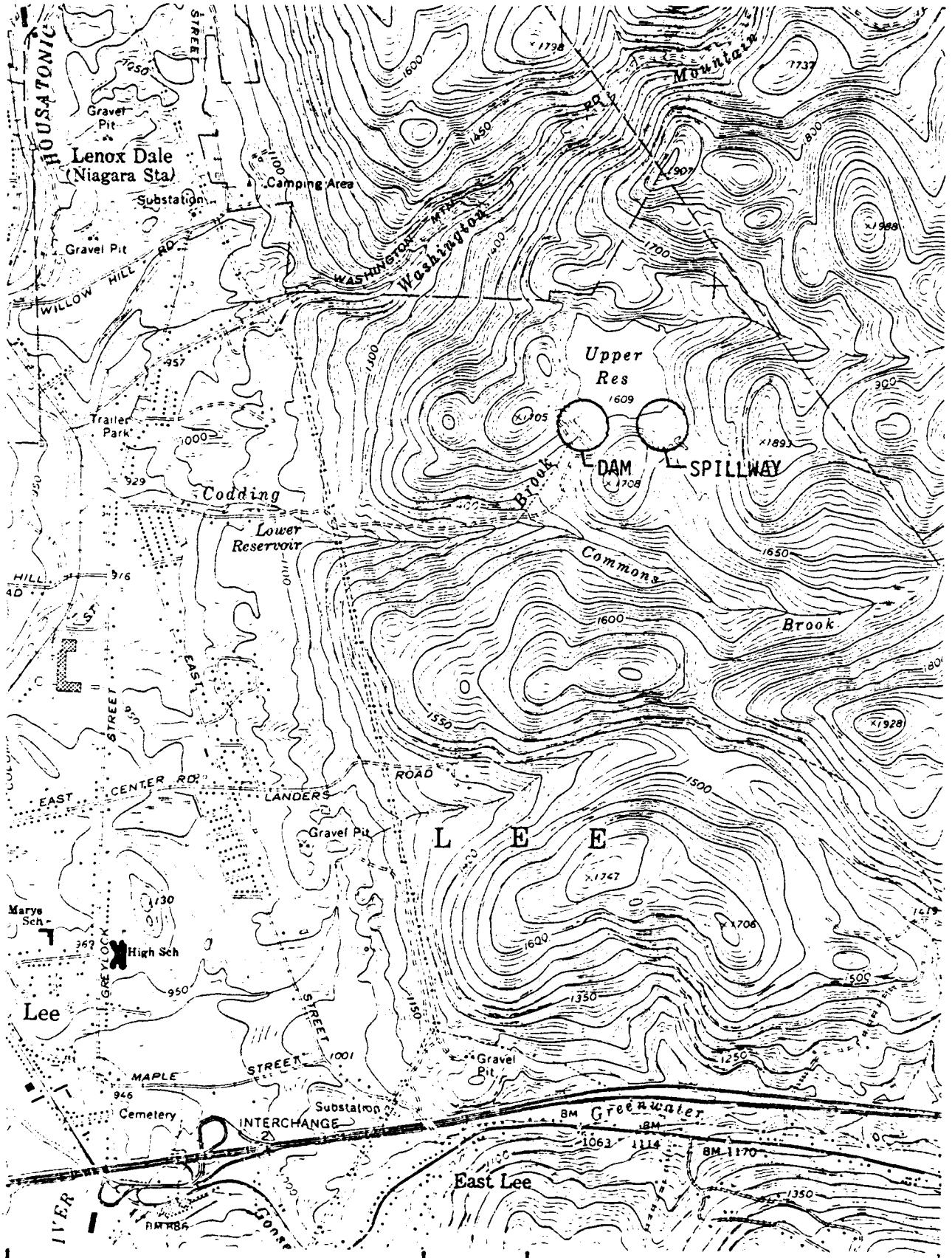


2. PLAQUE ON GATE HOUSE EXTERIOR.



LEAHEY (UPPER) RESERVOIR DAM
IDENTIFICATION NO. = MA. 00265

N

LOCATION MAP
USGS QUADRANGLE
EAST LEE, MA.
Scale: 1"=2000'

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
LEAHEY (UPPER) RESERVOIR DAM
MA 00265

SECTION 1: PROJECT INFORMATION

1.1 General

a. Authority - Public Law 92-367, 8 August 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a national program of dam inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region.

Camp Dresser & McKee Inc. has been retained by the New England Division to inspect and report on selected dams in the State of Massachusetts. Authorization and notice to proceed was issued to Camp Dresser & McKee Inc. under a letter of 12 July 1978, from Colonel John P. Chandler, Corps of Engineers. Contract No. DACW 33-78-C-0354 has been assigned by the Corps of Engineers for this work. Haley and Aldrich, Inc. has been retained by Camp Dresser & McKee Inc. for the soils and geological portions of the work.

b. Purpose - The primary purpose of the investigation is to:

(1) Perform technical inspection and evaluation of non-Federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-Federal interests.

(2) Encourage and assist the States to initiate quickly effective dam safety programs for non-Federal dams.

(3) Update, verify and complete the National Inventory of Dams.

1.2 Description of Project

a. Location - Leahey (Upper) Reservoir Dam is located on Codding Brook, approximately 1.6 miles upstream from its confluence with the Housatonic River. The body of water impounded by the dam is named Leahey (Upper) Reservoir. The dam and spillway are located at the southwest corner and southeast corner of the reservoir, respectively. Access to the dam is via Reservoir Road off of East Street in the Town of Lee, Massachusetts, as shown on the report's location map.

b. Description of Dam and Appurtenances - Leahey (Upper) Reservoir Dam consists of an earthen embankment approximately 610 ft. long and 56 ft. high. The dam is part of the water supply system for the Town of Lee, Massachsuetts. The gatehouse which contains the controls for the water transmission pipeline and the reser voir drain is located on the upstream face of the dam immediately adjacent to the crest at the middle of the dam. The spillway is located approximately 1,000 ft. to the east of the dam along the south edge of the reservoir. Water going over the spillway flows into Commons Brook which joins Codding Brook, approximately 1,400 ft. below the dam.

Record plans show the dam to be a zoned rolled earth embankment. The core is an "impervious till" keyed 3 ft. into the underlying rock. The down stream toe of dam is a rock fill. Pervious filter material is placed from the downstream edge of the crest on a 3 horizontal to 5 vertical slope to the underlying rock, along the ledge rock and then upward on the upstream face of the rock fill. Upstream protection of the dam is afforded by a 3 ft. blanket of rock placed on 1 ft. of gravel and 2 ft. of filter material. The downstream face of the dam from the crest to the rock fill is loamed and seeded. The crest of the dam has a 6-in. depth of gravel for vehicle traffic. The crest width of the dam is 13-1/2 ft. Both upstream and downstream face of the dam are on a 2-1/2 horizontal to 1 vertical slope.

The gatehouse on the dam has a reinforced concrete sub-structure. The sub-structure extends down and is doweled into the rock below. The approximate plan dimensions for the structure are 16 ft.-6-in. by 8 ft.-6-in. The superstructure of the gatehouse has concrete block walls and a timber structural roof, covered by a 5 ply bonded roof. The structure is built over and around a 12-in. water main coming from an older dam now beneath the waters of the reservoir. This pipe serves as a low level intake. The continuation of the pipe is the water transmission main for the Town of Lee. A 12-in. cast iron pipe with concrete seep collars serves as the upper level intake and is controlled within the gatehouse. This intake is at the face of the dam approximately 25 ft. below the crest of the dam. The reservoir drain is an 18-in. cast iron pipe extending from the gatehouse and discharging approximately 100 ft. beyond the downstream toe of the dam. The control valve of the drain is at the inlet end of the pipe within the gatehouse.

The spillway for Leahey (Upper) Reservoir Dam is an earth and rock cut approximately 400 ft. long and 85 ft. wide. Side slopes of the spillway are approximately 1 to 1. The spillway crest is formed by an 18-in. wide, 24-in. high concrete weir approximately 150 ft. from the spillway entrance. The earthen spillway channel slopes upward on a 1 percent slope to the concrete weir crest. The weir projects above the adjacent channel invert

approximately 6-in. The earthen channel slopes downward from the weir on a 1 percent grade until it intercepts original ground. Water is carried to Commons Brook via the natural slope of the land. The surface of the earth cut was not intentionally vegetated but sparce, natural vegetation has taken place. The side slopes contain some exposed rock cuts, particularly at the concrete weir.

c. Size Classification - The height of the dam is approximately 56 ft. and the estimated storage capacity is 880 acre ft. at spillway crest. According to the guidelines established by the Corps of Engineers, the height of the dam is in the intermediate category whereas the storage capacity is in the small category. Therefore, the dam is classified in the intermediate category.

d. Hazard Classification - Calculations show that if the dam were breached, the upper reaches of Codding Brook would sustain severe channel erosion but no damage to the sparsely located residences would occur. The lower portions of Codding Brook would sustain damage from shallow depth, high velocity flooding from point approximately 600-ft. east of East Street to the Housatonic River. Since this flooding would affect an estimated 10 to 15 dwellings, it is in the "high" hazard potential classification.

e. Ownership - The dam and reservoir are owned by the Town of Lee. The owner is represented by Mr. J. Peter Scolforo, Supt. Dept. of Public Works, Airoldi Building, Railroad Street, Lee, Massachusetts, 02138 (phone: 413/243-2100).

f. Operator - Mr. J. Peter Scolforo, Supt. Dept. of Public Works, Airoldi Building, Railroad Street, Lee, Massachusetts, 01238 (phone: 413/243-200) is assigned responsibility for operation of the dam.

g. Purpose of the Dam - Leahey (Upper) Reservoir is part of the water supply system for the Town of Lee, Massachusetts.

h. Design and Construction History - The present Leahey (Upper) Reservoir Dam was designed in 1963 by Tighe and Bond, Consulting Engineers, 50 Payson Avenue, East Hampton, Mass. 01027. The dam and spillway were constructed during 1964 and 1965 by the Petricca Construction Company. The present dam enlarged the reservoir and the former dam is now beneath its waters. Two minor changes have been made to the dam since the original construction. The access road has been continued across the toe of the dam to the right abutment and a perforated drain has been placed near the access road as it climbs to the left abutment. The drain was placed to intercept water coming from the high ground to the southeast of the left abutment.

i. Normal Operational Procedures - The dam is inspected on roughly a yearly basis by the Town's Consultant, the engineer who designed the dam. The gatehouse is checked by town personnel at more frequent intervals. Maintenance on the dam and spillway is performed on a need basis. However, there is no written procedure for the operation and maintenance of the dam.

1.3 Pertinent Data

The elevations on the design plans and the plaque on the gatehouse are marked as on mean sea level datum. It should be noted, however, that the spillway crest is stated as Elevation 1598.0 while the U.S.G.S. Quadrangle, East Lee, Massachusetts, shows the reservoir surface at Elevation 1,609. All elevations shown in this report are based on the elevations shown on the record plans for the dam and spillway.

a. Drainage Area - The Leahey (Upper) Reservoir Dam is located at the headwaters of Codding Brook in the Town of Lee, Massachusetts. The watershed above the dam is 0.68 sq. miles and extends into the Town of Washington, Massachusetts. The drainage basin has steep slopes on either side of Codding Brook. The basin is roughly symmetrical about the brook which flows on a steep gradient to the northeast corner of the Leahey (Upper) Reservoir. The reservoir occupies approximately 9 percent of the total drainage area.

b. Discharge at Dam Site - There are no known records on past floods at Leahey (Upper) Reservoir Dam. Estimated discharges are in the list that follows:

(1) Outlet works (conduits) size: 1-12" water transmission line and 1-18" reservoir drain.

(2) Maximum known flood at damsite - unknown.

(3) Ungated spillway capacity at top of dam 5,420 cfs @ 1605.5 elev.

(4) Ungated spillway capacity at test flood elevation 1,510 cfs @ 1601.2 elev.

(5) Gated spillway capacity at normal pool elevation - N/A

(6) Gated spillway capacity at test flood elevation - N/A

(7) Total spillway capacity at test flood elevation 1,510 cfs @ 1601.2 elev.

(8) Total project discharge @ test flood elevation 1,510 cfs @ 1601.2 elev.

c. Elevation (ft. above MSL)

(1) Streambed at centerline of dam.....1549.0

(2) Maximum tailwater.....N/A

(3) Upstream portal invert diversion tunnel.....N/A

(4) Recreation pool (water supply pool).....1598.0

(5) Full flood control pool.....N/A

(6) Spillway crest.....1598.0

(7) Design surcharge (Original Design).....Unknown

(8) Top of dam.....1605.5

(9) Test flood design surcharge.....1601.2

d. Reservoir

(1) Length of maximum pool.....2,020 ft.

(2) Length of recreation pool (water supply pool)....2,000 ft.

(3) Length of flood control pool.....N/A

e. Storage (acre-feet)

(1) Recreation pool (water supply pool).....880

(2) Flood control pool.....N/A

(3) Spillway crest pool.....880

(4) Top of dam.....1160

(5) Test flood pool.....1040

f. Reservoir Surface (Acres)

(1) Recreation pool (water supply pool).....47.1

(2) Flood-control pool.....N/A

(3) Spillway crest.....47.1

(4) Top of dam.....52

(5) Test flood pool.....50

g. Dam

(1) Type.....Earth Embankment

(2) Length.....610 ft.

(3) Height.....56.5 ft.

(4) Top Width.....13.5 ft.

(5) Side Slopes.....2 1/2 H:1V

(6) Zoning.....Impervious core with filter layers, random fill zones and a rock fill toe.

(7) Impervious core.....Apparently glacial "till"

(8) Cutoff.....Core extends into shallow key cut into rock.

(9) Grout curtain.....None Known

h. Diversion and Regulation Tunnel.....None

i. Spillway

(1) Type.....Earth channel, broad crested weir

(2) Length of weir.....85 ft.

(3) Crest elevation.....1598

(4) Gates.....None

(5) U/S Channel.....-1% Slope

(6) D/S Channel.....+1% Slope

j. Regulating Outlets - There are two intake pipelines to the gatehouse. The lower intake is a 12-in. asbestos cement Class 150 pipeline which served as the transmission main from the former dam now beneath the reservoir surface. The invert elevation of this pipeline is unknown; however, it passes through the gatehouse with an approximate invert elevation of 1547. This line was modified during the construction of Leahey (Upper) Reservoir Dam by encasing the pipe within the limits of the dam with concrete and adding a gated intake approximately 12 ft. above the pipeline at the upstream toe of the dam. The upper intake is a 12-in cast iron pipe with an invert elevation of 1580. This

intake is controlled by a gate valve just inside the gatehouse. The gatehouse substructure is divided into two chambers. A 12-in. gate valve near the base of the structure and two 3 ft. 6-in. wide screens in series with an invert elevation of 1,570 provides the connection from one chamber to the other. The 12-in. AC pipeline from the former dam is valved at the dividing wall between the gatehouse chambers and at elbow outlets in each chamber. The reservoir drain is an 18-in. cast iron pipe, valved at the gatehouse downstream chamber, and outlets approximately 100 ft. downstream from the toe of the dam. All valves are manually operated. A wall mounted float gage measures the depth of water in the downstream chamber of the gatehouse.

SECTION 2: ENGINEERING DATA

2.1 Design - Design records for this dam are available at the offices of Tighe & Bond, Consulting Engineers, 50 Payson Avenue, East Hampton, Massachusetts, 01027. Record drawings of this facility are available at both the office of Tighe & Bond and the office of Department of Public Works, Lee, Massachusetts. The record drawings contain the sub-surface exploration performed at the site prior to construction. Copies of pertinent data on this facility are included in Appendix B of this report.

2.2 Construction - Construction records for this project are located at the offices of Tighe & Bond, Consulting Engineers, 50 Payson Avenue, East Hampton, Massachusetts, 01027.

2.3 Operation - No operation records other than the inspection reports on the facility and water level readings at the reservoir were located. The design engineer performs inspections of the facility on roughly an annual basis.

2.4 Evaluation

a. Availability - Documents described above are available at the offices of Tighe & Bond, Consulting Engineers, 50 Payson Avenue, East Hampton, Massachusetts, 01027. A portion of these documents are in storage and may require time to make them readily available. Some of the documents are also available at the Department of Public Works, Lee, Massachusetts.

b. Validity - The record drawings for this project were in excellent agreement with the features observed in the field.

c. Adequacy - The available data, in combination with the visual inspection described in the following section, is adequate for the purposes of the Phase I Investigation.

SECTION 3: VISUAL INSPECTION

3.1 Findings

a. General - The Phase I Visual Examination of the Leahey (Upper) Reservoir Dam was conducted on 7 September 1978.

In general, the earthen embankment, spillway and gatehouse were observed to be in good condition. The reservoir level at the time of the site examination was 8 ft. below the weir crest.

Visual inspection checklists for the site visit are included in Appendix A and selected photographs are given in Appendix C.

b. Dam - The Leahey (Upper) Reservoir Dam embankment is generally in good condition. There was no evidence of settlement, lateral movement or significant erosion. Seepage was evident at the toe below the access road, but is apparently a long-standing condition.

The following specific items were noted:

(1) There was a concentrated water flow of several gallons per minute from the ground alongside a partly buried log at the extreme toe, between the reservoir drain pipe and an unidentified 12-in. CMP outlet. The area is shown in Photo No. 10.

(2) There were two other locations of slight seepage with rust staining in the area at the toe generally below the 12-in. CMP outlet.

(3) The downstream slope to the extreme toe below the access road as shown in Photo Nos. 3, 7 and 10 has a heavy growth of grass, weeds, brush and young trees, plus some old cuttings, making examination for seepage difficult.

(4) The wheel ruts of the roadway across the dam crest as shown in Photo No. 1 offer some potential for local erosion if they cause concentrations of runoff flow down the dam slope.

(5) Four of the five observation wells in the dam slope are either quite shallow or are partly obstructed. A weighted tape would not penetrate more than about 5 ft. below the surface of the embankment. The wells were generally dry at these depths, although two may have had a few inches of water at the bottom. A typical well is shown in Photo No. 8.

(6) A loss of riprap protection has occurred on the upstream slope of the dam near the left abutment as shown in Photo 4.

The dam appears to generally have the geometry shown on the 1963 design drawings, except for the additional berm and access road across the toe.

c. Appurtenant Structures - The spillway as shown in Photos Nos. 11, 12, and 13, is in good condition. The spillway is an earth and rock cut with relatively steep side slopes. A fixed concrete weir controls the maximum reservoir level. The major portion of the spillway is unobstructed. There is some growth of brush within the channel, especially at the concrete weir. One stump was observed on the channel bottom. As shown in Photo No. 13, loose rock is present on each side of the concrete weir. The design borings indicate, in the area of the weir, the invert of the spillway is in rock cut and, therefore, only a thin soil blanket is present at the channel bottom and hazardous scour could not occur during unusual discharge. Loose rock is present on the left side slope adjacent to the concrete weir. Rock with fractures present was observed at the right side slope adjacent to the weir.

The gatehouse substructure appeared to be in good condition. The concrete block superstructure, shown in Photo No. 5, is chipped at the northwest corner of the building and there is a crack present in the joints of the south wall of the building. The door is starting to show some signs of rust. Bullet impressions are present in the door as well as in the exterior walls of the gatehouse. The interior of the gatehouse, as shown in Photo No. 6, is in good condition. The six manually operated gate valves are operational. The overhead chainfall is operational; however, some rusting is starting to occur on the chainfall beam. Wooden covers are present over the hatch openings. The outlet of the reservoir drain from the gatehouse has no formal structure. As shown in Photo No. 9, the outlet end of the drain is protected by stones placed over the pipe.

d. Reservoir Area - The reservoir is surrounded by moderate to steeply sloped hills which are heavily forested. The reservoir perimeter is cleared only to an approximate elevation of 5 ft. above the crest of the dam. There is no development along the banks of the reservoir. There was no observed potential for major slope failures into the reservoir. Codding Brook flows into the reservoir from the east. The brook runs along a steep gradient from the heavily forested upper regions of the mountain. There have been no apparent alterations to the surface of the watershed which would extensively effect the runoff characteristics as they existed during the design of the facilities.

e. Downstream Channel - The steepest section along Codding Brook is the reach immediately downstream of the dam where it drops 170-ft. in a 1,400-ft. distance (12.1% slope) to the confluence with Commons Brook. From the Commons Brook confluence to the Lee

Water Department Lower Reservoir, where the inhabited areas begin, the slope decreases slightly as it falls 270 ft. in a 3,000 ft. distance (9.0%). A 7-ft. wide by 3-ft. high stone box culvert is located just upstream of Commons Brook and a 13 ft. wide by 8 ft. high bridge with concrete abutments and steel girders is located about 300 ft. downstream of the Lower Reservoir. From the Lower Reservoir to East Street, the channel slope again flattens, dropping 190 ft. in the next 2,800 ft. (6.8%), while the final reach from East Street to the Housatonic River flattens to a slope of less than 1.0%. The culvert at East Street is a 10-ft. by 7-ft. multi-plate arch, while a 12-ft. wide by 4.5-ft. high concrete box culvert conveys the flow beneath Greylock Street. Throughout most of its above described length, Codding Brook cuts a very narrow swift flowing channel in the heavily wooded steep sloped terrain characteristic of the area. Only in the 1,000-ft. reach immediately upstream of East Street does the channel slope decrease with flatter adjacent terrain. It is in this area that some dwellings and other associated buildings are located.

3.2 Evaluation - Except for the minor maintenance items noted in the visual examination, the Leahey (Upper) Reservoir Dam and spillway appear to be well maintained and in good condition. The water surfacing below the toe of the dam at the former stream bed was noted during the original construction and during the intervening years. The water at this location should be monitored for any unusual increase in flow. A statement by the designer on this flow is included in Appendix B, page B-15 of this report. While the minor items should be given attention, there appears to be no significant potential for failure of the embankments or spillway at this time.

SECTION 4: OPERATIONAL PROCEDURES

4.1 Procedures - Although there is an informal routine for the operation of the dam, there is no written procedure.

4.2 Maintenance of Dam - It appears that there has been systematic maintenance of the dam embankment, except for the short slope down to the extreme toe below the access road.

4.3 Maintenance of Operating Facilities - The maintenance of the operating facilities is performed primarily on a demand basis. There is no written formal procedure established for the maintenance of the operating facilities. The operating facilities are primarily for the transmission of water to the Town of Lee and are operated as a part of performing this task.

4.4 Description of any Warning System in Effect - There is no formal established warning system or emergency preparedness plan in effect for this structure.

4.5 Evaluation - This dam is inspected by the Town's Consultant, the original designer of the dam, on roughly a yearly basis and observed by Town employees at more frequent intervals. In general, the maintenance on this dam is being attended to although there were minor areas observed during the site examination which require attention.

A formal Operations and Maintenance Manual and a formal warning system or emergency preparedness plan should be established for this dam.

SECTION 5: HYDRAULIC/HYDROLOGIC

5.1 Evaluation of Features

a. General - Leahey (Upper) Reservoir is a water supply dam consisting of a 610-ft. long embankment approximately 56 ft. high and located on Codding Brook in Lee. The reservoir has a water surface area of 47 acres at spillway crest elevation of 1598 and an estimated total storage capacity of 880 acre-feet. The dam is an earth embankment with an impervious core and the spillway is located some 1,000 feet to the east of the main dam in the southeasterly corner of the reservoir. The spillway control consists of a concrete weir approximately 85 feet long which has been notched between the rock excavated walls of natural terrain. The approach to the spillway weir from the reservoir is a naturally sloping terrain approximately 150 ft. long while downstream of the spillway weir, the discharge channel gradually slopes away for a distance of approximately 250 ft. to the beginning of a small stream which then conveys the flow a distance of 1,700 ft. to Commons Brook. The flow is carried in Commons Brook for 2,000-ft. where it enters Codding Brook which carries it to the Housatonic River approximately 7,000 ft. to the west.

b. Design Data - The only available hydraulic/hydrologic criteria utilized in this report was the information furnished on the plans pertaining to area-elevation-storage capacity data.

c. Experience Data - The dam was designed in 1963 and constructed in 1964-1965 during the three-year drought period which affected much of New England. Since that time, there have been no major floods and there are also no records available of high water levels observed in the reservoir.

d. Visual Observations - The inspection of the reservoir was made on 7 September 1978. At that time, the water level was some 15.9 ft. below the gatehouse floor and some 8.3 ft. below the spillway crest. The low level enabled inspection of the approach to the spillway on the reservoir side, as well as inspection of the channel immediately downstream of the spillway. The weir surface is noted to be in excellent condition. Stone is present on both upstream and downstream faces of the weir. The downstream spillway area supports some growth of low height brush, grasses and weeds. The downstream channel commencing at the lower end of the spillway channel was noted to be in good condition. It is a natural channel through very steep and rocky terrain.

e. Test Flood Analysis - Based upon Corps of Engineers Guidelines, the recommended test flood for the size (intermediate) and hazard potential (high) is within the range of 1/2 PMF to a full PMF (Probable Maximum Flood). The PMF was determined using the Corps of Engineers Guideline curves for "Estimating Maximum Probable Discharges" in the Phase I, Dam Safety Investigations. The watershed terrain was determined to be very steep to mountainous and an inflow rate of 2,925 cfs per square mile was utilized with the drainage area of .682 square miles. This results in a test flood inflow of approximately 2,000 cfs which is the value that was utilized for this analysis.

Storage routing of the PMF inflow of 2,000 cfs indicated that this peak rate would be reduced to approximately 1,510 cfs by the storage and spillway characteristics of the reservoir. The flow characteristics of the spillway weir cause the level in the reservoir to rise to elevation 1601.2 during the 1,510 cfs discharge. This level is approximately 4 ft. below the top of the dam. Since both the weir and spillway channels are adequate to pass the routed test flood flow with 4 ft. of freeboard remaining at the dam, overtopping of the dam is not considered a problem.

f. Dam Failure Analysis - Based on Corps of Engineers Guidelines for Estimating Dam Failure hydrographs and assuming that a failure would occur along a section 220 ft. of the dam with a reservoir level 3 ft. above spillway crest, the failure would result in a peak outflow of 160,000 cfs. The flow would have a tremendous velocity in the upper reaches of Codding Brook and overtop the first two bridges by 17 to 18 ft. The first bridge is at the confluence of Commons Brook and Codding Brook while the second bridge is in the vicinity of the Lee Water Department Lower Reservoir. There are no dwellings in these reaches of Codding Brook or in its flood plain. However, considerable erosion would occur in the brook and material would be transported by the fast moving water. As Codding Brook approaches a point approximately 600 ft. east of East Street, the flow would fan out and continue to flow at rather shallow depths of 2 to 4 ft. at velocities in the vicinity of 20 feet per second. This would affect dwellings on the lower end of Reservoir Road in the vicinity of East Street as well as approximately six dwellings along Greylock Street, thus comprising a total of 10 to 15 affected dwellings. There would be substantial property damage to these dwellings and potential loss of life in this immediate area under the assumed dam failure conditions. For this reason, the dam is in the "high" hazard classification.

SECTION 6: STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observation - There was no visible evidence of dam embankment instability during the site examination on 7 September 1978. The seepage at the extreme toe of the dam had been previously reported and showed no evidence of active erosion or piping. Thus, it is not considered to pose an immediate hazard to the stability of the downstream slope. It should be noted that the reservoir level was approximately 15 ft. below the top of the embankment at the time of the inspection, with the result that the forces tending to cause instability were considerably lower than design levels.

b. Design and Construction Data - The design drawings for the Leahey (Upper) Reservoir Dam, copies of which are included in Appendix B, show cross sections for the dam that incorporate the various usual features of dam design. While construction data for this project has not been reviewed, the design configuration appears reasonable. Assuming that the dam was constructed in accordance with the drawings, using materials with satisfactory permeability and filter characteristics, it would be expected to be adequately stable under static loading conditions.

The drawings do not offer an explanation of the source of the seepage flow, since the rock fill toe can collect seepage water from the embankment, the foundation rock, the abutments and/or the various pipes, and convey it all to the low point of the rock at the toe. The rock fill could also collect soil particles that might enter with the seepage.

c. Operating Records - No operating records other than inspection reports by the State and the Town's consulting engineer, and reservoir water surface elevations were located.

d. Post-Construction Changes - The lower level access road across the dam toe was built after the original dam construction and a perforated drain was placed along the access road as it climbs to the left abutment. There are no other known post-construction changes to the embankment.

e. Seismic Stability - Leahey (Upper) Reservoir Dam is located in Seismic Zone No. 1 and in accordance with recommended Phase I Guidelines does not warrant seismic analysis.

SECTION 7: ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition - The visual examination of the Leahey Reservoir Dam embankments, and the review of available information from the design engineers, did not reveal evidence of failure or conditions which would warrent urgent remedial treatment. The embankment is generally in good condition. However, some addi?tional maintenance and investigation should be undertaken, particularly with respect to the seepage, as outlined hereinafter.

b. Adequacy of Information - Generally, available drawings and other information were adequate for the Phase I Investigation. How=-ever, there is insufficient information for a detailed evaluation of the seepage that is occurring through, under or around the embankment, partly because the rock fill toe obscures the source of the water.

c. Urgency - The recommended additional investigation and remedial measures outlined in Sections 7.2 and 7.3, respectively, should be undertaken within two years of receipt of the report by the Owner.

d. Need for Additional Investigation - Additional investigations should be performed by the Owner as outlined in the following section.

7.2 Recommendations

It is recommended that the following additional investigation be performed by the Owner:

1. An investigation to attempt to determine the source and extent of the seepage that is occurring at the toe of the dam. This would include a detailed review of construction and post-construction records, checking the condition of the observation wells and monitoring the observation wells systematically during changes in reservoir water levels to compare the phreatic surface in the dam to seepage variations. If necessary, additional wells should be installed. Seepage variations should also be checked against closure conditions of the valves in the Gatehouse.

7.3 Remedial Measures

a. Operation and Maintenance Procedures - It is recommended that the following operation and maintenance procedures be adopted by the Owner to correct deficiencies noted during the visual examination:

(1) Include the lowest part of the downstream slope, from the access road down to the extreme toe, in the area that is routinely cleared and kept cut.

(2) Observe, record and evaluate the seepage and the observation well water levels on a regular basis.

(3) Clear the spillway invert and side slopes of brush and remove obstructions from the spillway as part of the routine maintenance on the dam.

(4) Fill the wheel ruts in the crest of the dam with compacted gravel and grade to a uniform cross-section.

(5) Replace the riprap protection on the upstream slope of the dam adjacent to the left abutment and where needed. Riprap bedding layers in these areas (see Appendix B-17) should be checked and if eroded, should be restored.

The Owner should also develop formal maintenance procedure, operational procedure and emergency procedures plan and warning system in cooperation with downstream officials. Due to the presence of seepage, the dam should be kept under surveillance during periods of high precipitation and high reservoir levels. Finally, it is recommended that the Owner continue the program of annual technical inspections.

7.4 Alternatives - Not applicable.

APPENDIX A
INSPECTION TEAM ORGANIZATION AND CHECK LIST

VISUAL INSPECTION PARTY ORGANIZATION

NATIONAL DAM INSPECTION PROGRAM

DAM: Leahey (Upper) Reservoir

DATE: September 7, 1978

TIME: 10:00 a.m.

WEATHER: 65° F + Overcast

WATER SURFACE ELEVATION UPSTREAM: 15.9 feet below gatehouse floor (tape)
8.3 feet below weir crest (gage)

STREAM FLOW: 0.75 cfs from Reservoir Drain

INSPECTION PARTY:

1. Roger H. Wood - CDM - structural/operations
2. Charles E. Fuller - CDM - Hydraulic/Hydrology
3. Joseph E. Downing - CDM - Hydraulic/Hydrology (Ass't)
4. Peter LeCount - Haley & Aldrich - Soils
5. _____
6. _____

PRESENT DURING INSPECTION:

1. Everett Buffoni - Lee DPW
2. Joseph Leahey - Lee DPW
3. _____
4. _____

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: Leahey (Upper) Reservoir DATE: 9/7/78

EMBANKMENT: Main Dam

CHECK LIST	CONDITION
1. Upstream Slope	1.
a. Vegetation	a. Very little
b. Sloughing or Erosion	b. None evident
c. Rock Slope Protection - Riprap Failures	c. Riprap to crest, coarse gravel sizes to approx. 5' x 5'.
d. Animal Burrows	d. None observed
2. Crest	2.
a. Vegetation	a. Grass alongside gravel road
b. Sloughing or Erosion	b. Slight rutting along road
c. Surface cracks	c. None evident
d. Movement or Settlement	d. None evident
3. Downstream Slope	3.
a. Vegetation	a. Grass, occasional weeds (main slope)
b. Sloughing or Erosion	b. None evident
c. Surface cracks	c. None observed
d. Animal Burrows	d. Noted one small burrow (4" dia.) near left quarter point.
e. Movement or Cracking near toe	e. None observed
f. Unusual Embankment or Downstream Seepage	f. Flow from alongside log at extreme toe below service road; continues along toe approx. 20 ft. then turns downstream; two small add'l areas of rust stain & slight flow at toe in same area.
g. Piping or Boils	g. Flows noted above do not indicate soil mov't; they may possibly be related to discharge pipe outletting roughly 5ft higher & 30 ft. to right
h. Foundation Drainage Features	h. Not known; 6 in. CMP pipe outlets part way up left slope downstream from toe; large area of riprap above service road and either riprap or rock fill in slope below road.
i. Toe Drains	i. Not known; may be drains with riprap
4. General	4.
a. Lateral Movement	a., b., c. Alignment looks good, no indication of movement.
b. Vertical Alignment	
c. Horizontal Alignment	
d. Condition at Abutments and at Structures	d. No indication of problems
e. Indications of Movement of Structural Items	e. None evident
f. Trespassing	f. Vehicle traffic on gravel roads (probably maintenance & operation)
g. Instrumentation Systems	g. Five observation walls in downstream slope.

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: Leahey (Upper) Reservoir Dam DATE: September 7, 1978

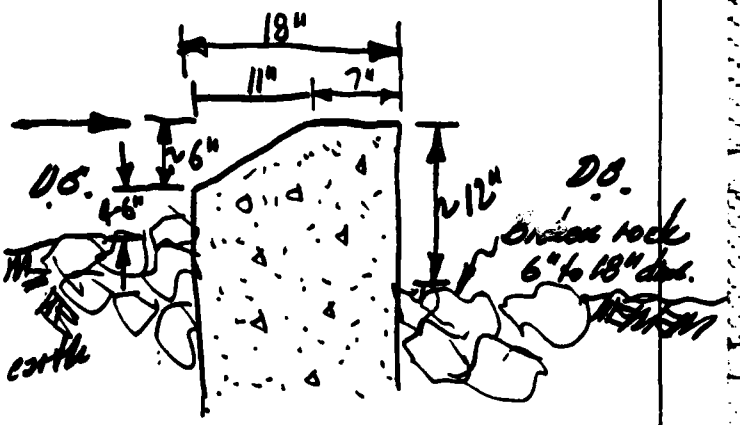
SPILLWAY:

CHECK LIST	CONDITION
1. Approach Channel	1.
a. General Condition	a. Excellent
b. Obstructions	b. One stump observed
c. Log Boom etc.	c. None
2. Weir	2.
a. Flashboards	a. None
b. Weir Elev. Control (Gate)	b. Uncontrolled
c. Vegetation	c. Light Brush
d. Seepage or Efflorescence	d. None observed
e. Rust or Stains	e. None observed
f. Cracks	f. Shrinkage cracks only
g. Condition of Joints	g. None observed
h. Spalls, Voids or Erosion	h. Loss of surface laitance
i. Visible Reinforcement	i. None observed
j. General Struct. Condition	j. Excellent
k. Other	k. Minor scour present to loose rock in front and behind concrete weir.
3. Discharge Channel	3.a. No structural apron present
a. Apron	b. None
b. Stilling Basin	c. Earth - surface good
c. Channel Floor	d. Light Brush
d. Vegetation	e. N/A
e. Seepage	f. None observed
f. Obstructions	g. Excellent
g. General Stuct. Condition	
4. Walls	4.
a. Wall Location Rt & Lt	a.
(1) Vegetation	(1) Brush both sides
(2) Seepage or Efflorescence	(2) N/A
(3) Rust or Stains	(3) N/A
(4) Cracks	(4) N/A
(5) Condition of Joints	(5) N/A
(6) Spalls, Voids or Erosion	(6) N/A
(7) Visible Reinforcement	(7) N/A
(8) General Struct.Condition	(8) Lt. side slope adjacent to weir has loose rock present. Rt. side slope adjacent to weir has fractured rock present. General condition of side slopes is good.

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: Leahey (Upper) Reservoir DATE: Sept. 7, 1978

SPILLWAY: Field Measurement of Spillway Weir

CHECK LIST	CONDITION
1. Approach Channel a. General Condition b. Obstructions c. Log Boom etc. 2. Weir a. Flashboards b. Weir Elev. Control (Gate) c. Vegetation d. Seepage or Efflorescence e. Rust or Stains f. Cracks g. Condition of Joints h. Spalls, Voids or Erosion i. Visible Reinforcement j. General Struct. Condition 3. Discharge Channel a. Apron b. Stilling Basin c. Channel Floor d. Vegetation e. Seepage f. Obstructions g. General Stuct. Condition 4. Walls a. Wall Location_____ (1) Vegetation (2) Seepage or Efflorescence (3) Rust or Stains (4) Cracks (5) Condition of Joints (6) Spalls, Voids or Erosion (7) Visible Reinforcement (8) General Struct.Condition	Spillway Length = 88'  SPILLWAY SECTION  ELEVATION LOOKING DOWNSTREAM Note: From spillway it is about 280' to d.s. discharge over where flow is channelled into rock lined bank bed

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

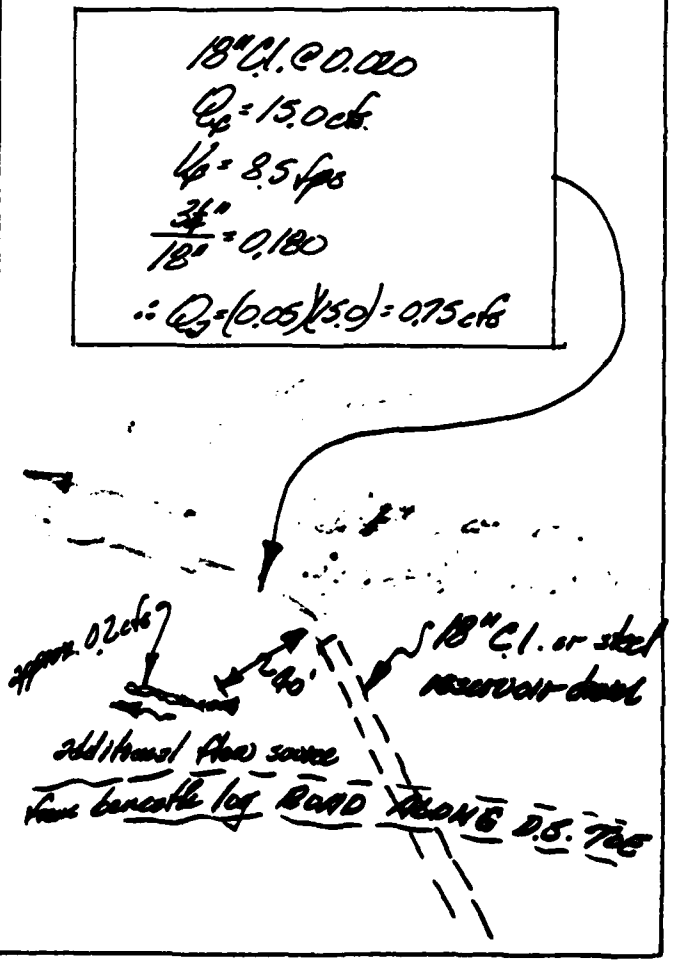
DAM: Leahey (Upper) Reservoir Dam DATE: September 7, 1978
OUTLET WORKS:

CHECK LIST	CONDITION
1. Inlet	1.
a. Obstructions	a. None observed
b. Channel	b. Intakes at face of dam
c. Structure	c. Intake not visible
d. Screens	d. None
e. Stop Logs	e. None
f. Gates	f. None observed
2. Control Facility	2.
a. Structure	a. Concrete substruct. in good condition. Concrete block superstruct. has chipped corner northwest side and crack in joints in south wall. Wooden covers over hatch openings. Gatehouse door has some rusting present and bullet impressions. Interior lifting beam starting to rust.
b. Screens	b. Manually operated double screen aluminim & stainless steel.
c. Stop Logs	c. N/A
d. Gates	d. Gates operational - Reservoir drain has 18" rising stem operator.
e. Conduit	e. 18" Reservoir drain pipe
f. Seepage or Leaks	f. None visible from upper portion.
3. Outlet	3.
a. Structure	a. Outlet is plain end of 18" pipe protected by stone.
b. Erosion or Cavitation	b. N/A
c. Obstructions	c. N/A
d. Seepage or Leaks	d. N/A
4. Mechanical and Electrical	4.
a. Crane Hoist	a. Chainfall-operational
b. Hydraulic System	b. N/A
c. Service Power	c. N/A
d. Emergency Power	d. N/A
e. Lighting	e. N/A
f. Lightning Protection	f. N/A

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: Leahey (Upper) Reservoir DATE: Sept. 7, 1978

OUTLET WORKS: Field Estimate of Discharge

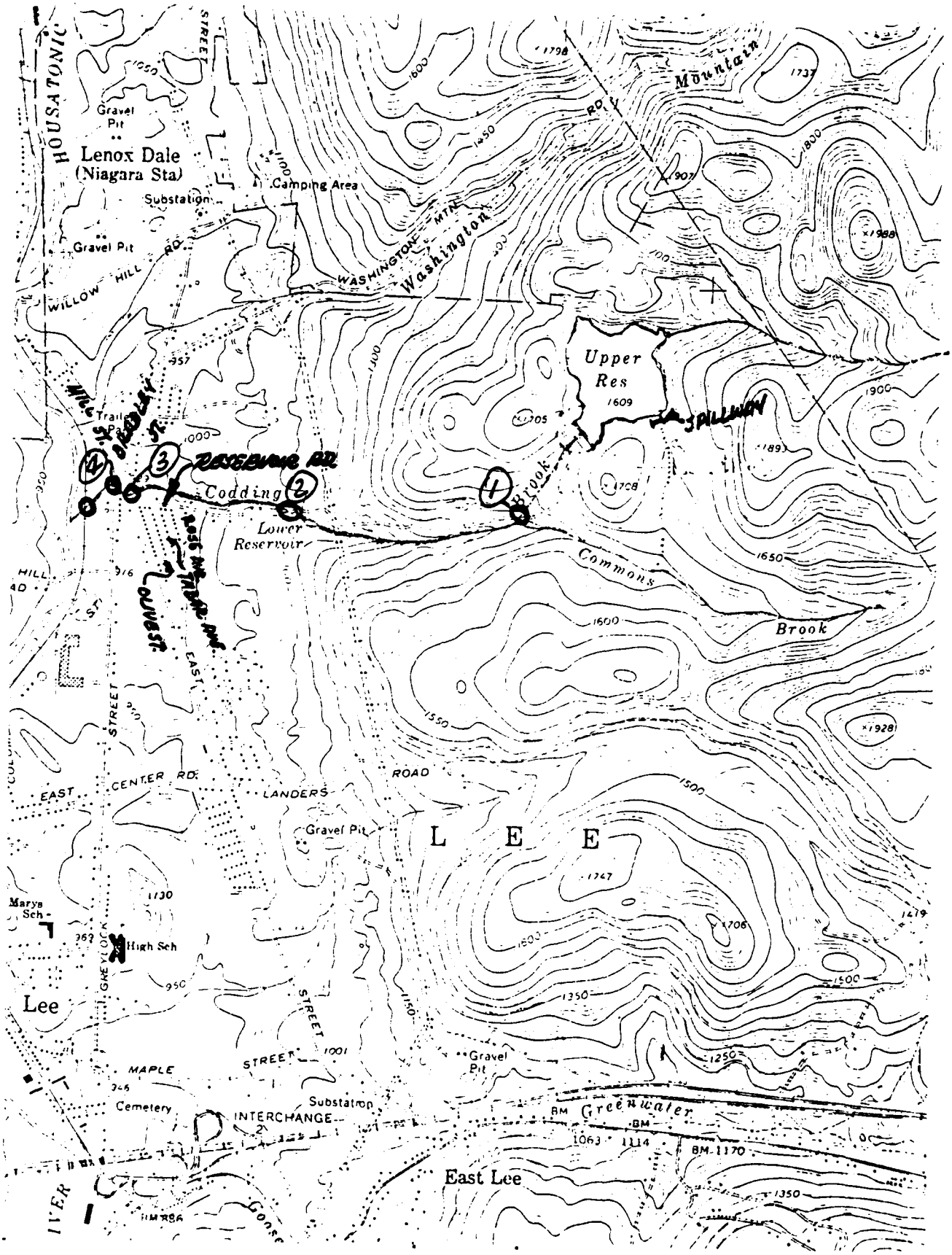
CHECK LIST	CONDITION
1. Inlet a. Obstructions b. Channel c. Structure d. Screens e. Stop Logs f. Gates 2. Control Facility a. Structure b. Screens c. Stop Logs d. Gates e. Conduit f. Seepage or Leaks 3. Outlet a. Structure b. Erosion or Cavitation c. Obstructions d. Seepage or Leaks 4. Mechanical and Electrical a. Crane Hoist b. Hydraulic System c. Service Power d. Emergency Power e. Lighting f. Lightning Protection	

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: LEAHY (UPPER)RESERVOIR DATE: September 7, 1978

HYDROLOGIC-HYDRAULIC CONSIDERATIONS:

CHECK LIST	CONDITION
1. Upstream Watershed a. Type of Terrain b. Hydrologic Controls	1a. Moderate to steep (5-10% slope) completely forested with mixture of hardwoods (oak) and other types (maple, birch, some evergreens) 1b. Excavated spillway w/conc. weir @SE corner of reservoir. 18"CI Res. drain
2. Reservoir a. Type of Terrain b. Development	2a. Bowl shaped with ledge outcrops, boulders, cobbles, sand & gravel 2b. None
3. Spillway a. Adjacent Low Points b. Spillway Approach (Slope) c. Spillway Discharge (Slope) d. Spillway Type	3a. No adjacent low points as spillway is a concrete weir set between rock cuts of 7&10 ft. 3b. Spillway approach is gravel & cobbles @ ½ to 1% slope 3c. Spillway discharge is gravel, cobbles & blasting tailings at about 1% slope for 250 ft. 3d. Spillway is reinforced concrete cast backfilled with only 10-12" of wall visible above approach & discharge slopes
4. Downstream Watershed a. Reach No. (1) Control (Bridge, dam, culvert, etc.) (2) Channel Characteristics (3) Development (4) Visible Utilities (5) Special Problems (Hospital, etc.)	Reach No. 1 - is about 250 ft. from spillway to beginning of rock-lined channel (natural) that begins steep descent (4%+) to Commons Brook. This first reach is man-made channel 85-100 ft. wide partially blasted from rock. The beginning of the rock-lined channel is the control for this reach. Reach No. 2 - is about 1200-ft long & drops 50-ft (4%+) before steepening to 13%+for 600-ft where it enters Commons Brook. Reach No. 3 - is Commons Brook which drops 90-ft in 2100-ft (4%+) to point where it enters Codding Brook. Reach No. 4 - is Codding Brook from Commons Brook to Lower Res. (drops 280-ft in 3000 appr. 10%) Reach No. 5 - is Codding Brook from Lower Res. to East St. (drops 170ft in 2300-ft appr.7.5%) only this section has some houses (3-6) which might be affected by dam failure otherwise all 5 reaches are undeveloped and in their natural state.



Leahey (Upper) Reservoir Dam

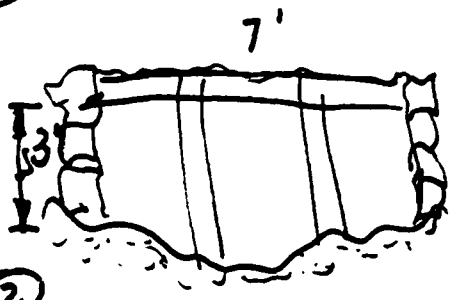
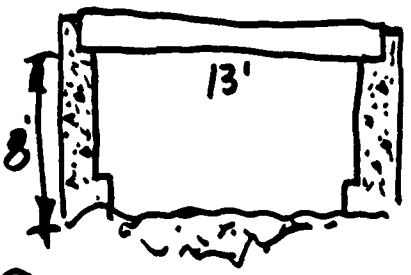
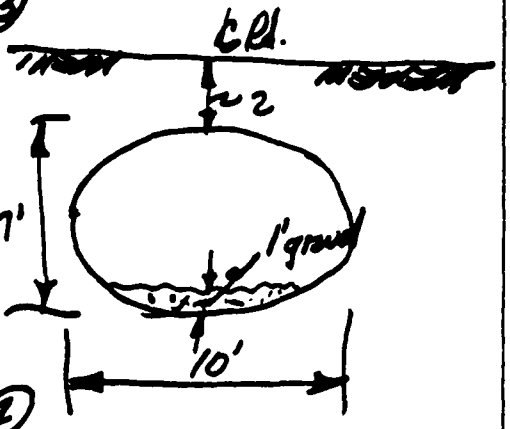
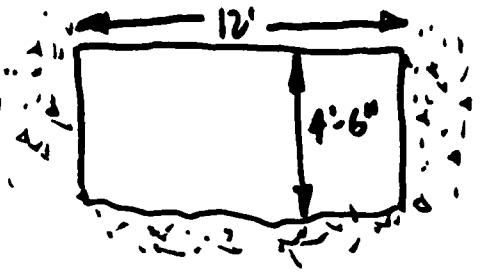
Lee, MA CDM

Location of Downstream
Culverts on Codding Brook
September 7, 1978
Scale 1" = 2000'

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM Leahey (Upper) Reservoir DATE: Sept. 7, 1978

SPECIAL STRUCTURE: Downstream Culvert Geometry

CHECK LIST	CONDITION
CULVERTS DOWNSTREAM OF DAM	
(1) 	7' wide x 3' high stone box with 6"x6" wood posts L=10'±
(2) 	8' high x 13' wide opening. Concrete abutments with steel girder spanning L=12'±
(3) 	10' x 7' multi plate arch L=25'
(4) 	12' wide x 4'-6" high conc. box culvert L=30' (1932)
	2nd culvert just u.s. 11' w x 4.5' h. Corrug. rd. bc. L=20'

Did not measure RR culvert adjacent to Housatonic River.

APPENDIX B
LIST OF AVAILABLE DOCUMENTS AND PRIOR INSPECTION REPORTS

PRIOR INSPECTION REPORTS

DRAWINGS

LIST OF DOCUMENTS

LEAHY (UPPER) RESERVOIR DAM

DOCUMENT	LOCATION
Proposed Reservoir and Dam Englargement of Upper Reservoir and Construction of New Spillway, August 1963	Town of Lee Dept. of Public Works Airoldi Building Railroad Street Lee, MA 02138 Tighe & Bond/Sci 50 Paysen Avenue Easthampton, MA 01027

1-2-150-12

Dam #12-5

INSPECTION OF DAMS

City or Town of Lee Date May 10, 1971

Name of Dam Leahey Reservoir Inspector R. Northrup

Owner Town of Lee Address Town Hall, Lee

Caretaker Town of Lee Address Town Hall, Lee

Location 1½ miles east of East Street on Reservoir Road

Type of Dimensions Earth Embankment 1040' long 56' high

riprap upstream, riprap at toe

Spillway, type and size None

Outlets, type and size 12" Water Service 18" Draw Down

Flashboards, type and height None

Date Built 1964 Condition Good

When last repaired _____ By whose orders _____

Nature of Repairs _____

Purpose of Dam Water Supply - Town of Lee

Approximate storage of water 47.1 Acres 240 MG

Approximate area of water shed 1 square mile

Possible damage due to failure of dam To life and property below.

Remarks Water 14' below top of dam. Rust colored flow noted across road at base of dam.

Recommendations Investigate rust colored flow.

Corrective Action

APPENDIX B-2

L-168

INSPECTION REPORT - DAMS AND RESERVOIRS

1. Location: City/Town Lee . Dam No. 1-2-150-12 .

Name of Dam Leahey (Upper Resevoir) . Inspected by: R.D.Jordan .

Date of Inspection 4-26-72 .

2. Prev. Inspection X .

Owner/s: per: Assessors .

Reg. of Deeds . Pers. Contact .

	Name	St. & No.	City/Town	State	Tel. No.
1.	Town of Lee	Town Hall	Lee, Ma		243-2100
2.					
3.					

3. Caretaker [if any] e.g. superintendent, plant manager, appointed by absentee owner, appointed by multi owners.

Name	St. & No.	City/Town	State	Tel. No.
Peter Scolforo	Town of Lee	Lee, MA		243-2100

4. No. of Pictures taken none .

5. Degree of Hazard: [if dam should fail completely]*

1. Minor . 2. Moderate .

3. Severe X . 4. Disastrous .

*This rating may change as land use changes [future development]

6. Outlet Control: Automatic . Manual .

Operative X yes: no.

Comments: 12" water main & 18" draw down

7. Upstream Face of Dam: Condition:

1. Good X . 2. Minor Repairs .

3. Major Repairs . 4. Urgent Repairs .

Comments:

8. Downstream Face of Dam: Condition: 1. Good X. 2. Minor Repairs___.
3. Major Repairs___ 4. Urgent Repairs___.

Comments:_____

_____.

9. Emergency Spillway: Condition: 1. Good_____. 2. Minor Repairs_____.
3. Major Repairs_____.4. Urgent Repairs_____.

Comments:_____

_____

_____

10. Water level @ time of inspection: 1"___. ~~ft.~~ above x. below_____.
top of dam_____.
principal spillway X_____.
other_____.

11. Summary of Deficiencies Noted:

Growth [Trees and Brush] on Embankment None.
Animal Burrows and Washouts "
Damage to slopes or top of dam "
Cracked or Damaged Masonry "
Evidence of Seepage "
Evidence of Piping "
Erosion "
Leaks "
Trash and/or debris impeding flow "
Clogged or blocked spillway "
Other_____.

12. Remarks & Recommendations: [Fully Explain]

Mr. Peter Scolforo, Town Supt. and Mr. Geo. McDonnell, Tighe & Bond Eng's , present at the inspection.

The dam appears to be in good condition. The slopes are well cleared and stable and there is no indication of settlement on the embankment. All seepage drains are functioning properly. The rust colored water noted in the 1971 inspection report is coming from one of the drains.

The spillway is clear of any debris and is in good condition. There is no repair work needed at this time.

13. Overall Condition:

1. Safe____X____.
2. Minor repairs needed_____.
3. Conditionally safe - major repairs needed_____.
4. Unsafe_____.
5. Reservoir impoundment no longer exists [explain]

   Recommend removal from inspection list_____.

L-169

DESCRIPTION OF DAM

DISTRICT ONE.

Submitted by R.D.Jordan Dam No. 1-2-150-12

Date 4-26-72. City/Town Lee

Name of Dam Leahy (Upper Resevoir)

---

1. Location: Topo Sheet No. 5-C.

Provide 8-1/2" x 11" in clear copy of topo map with location of Dam clearly indicated.

---

2. Year built: 1964. Year/s of subsequent repairs

---

3. Purpose of Dam: Water Supply X. Recreational .

Irrigation . Other .

---

4. Drainage Area: 1 sq. mi. acres.

---

5. Normal Ponding Area: 47.1 Acres; Ave. Depth .

Impoundment: 240 million gals; acre ft.

---

6. No. and type of dwellings located adjacent to pond or reservoir

i.e. summer homes etc.

---

7. Dimensions of Dam: Length 1040. Max. Height 56.

Slopes: Upstream Face 2½:/ rockface.

Downstream Face 2½:1 earth.

Width across top 16'.

---

8. Classification of Dam by Material:

Earth X. Conc. Masonry . Stone Masonry .

Timber . Rockfill . Other .

---

9. A. Description of present land usage downstream of dam: 50 %rural; 50 % urban.

B. Is there a storage area or flood plain downstream of dam which could accommodate the impoundment in the event of a complete dam failure

Yes . No X-See Remarks.

L-169 A

DAM NO. 1-2-150-12

10.

Risk to life and property in event of complete failure.

No. of people 200±.

No. of homes 50±.

No. of Businesses _____.

No. of Industries 1. Type _____.

No. of Utilities _____. Type _____.

Railroads 1.

Other dams 3.

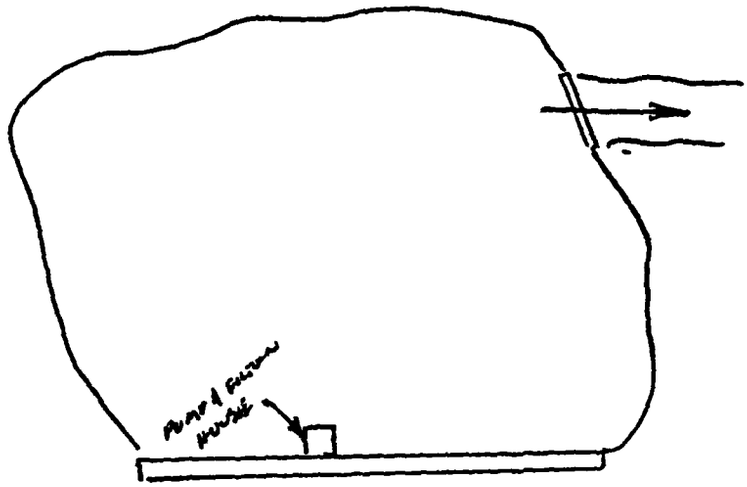
Other _____.

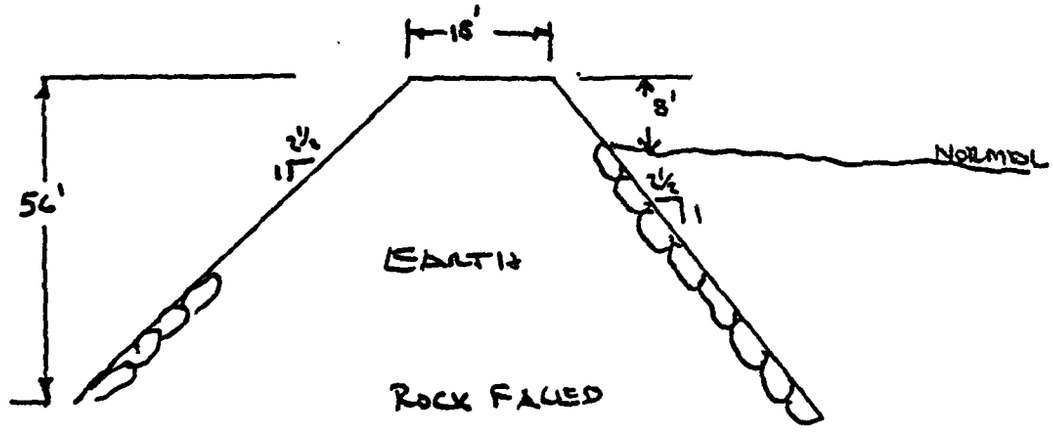
11.

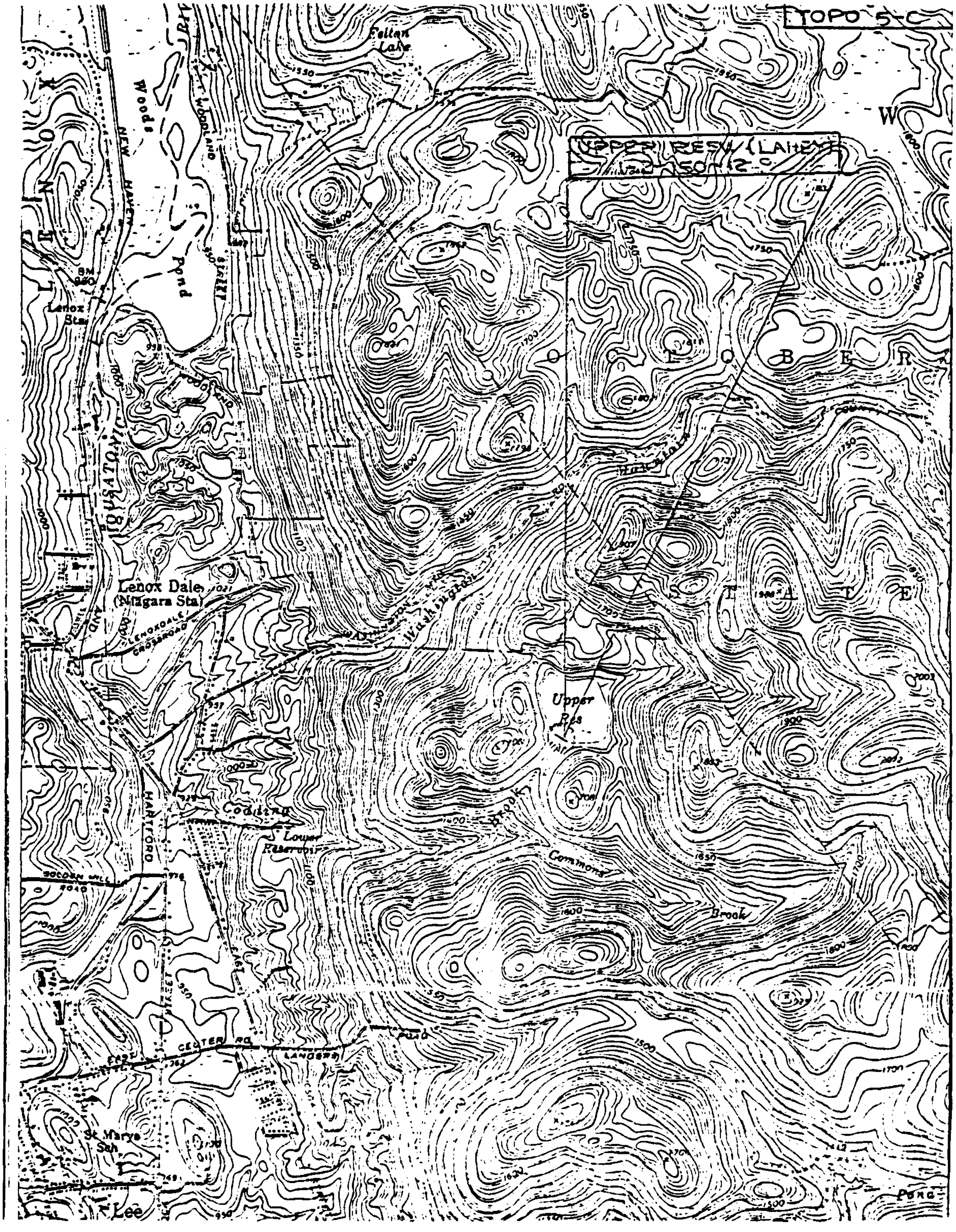
Attach Sketch of dam to this form showing section and plan on 8-1/2" x 11" sheet.

If Leahy failed it no doubt would destroy the Middle & Lower Resevoir as they are very small dams. Sever damage could occur to Resevoir Road and East Street and the homes in that area. The NH&H Railroad could be damaged, also Golden Hill Road, Columbia Mill and the Columbia Mill Dam.

LEAHY (UPPER RESV) LEG 1-2-150-12






TOPO 5-C
UPPER RES. (LAHEY)
Fellan Lake
Woods
Pond
Lenox Sta
Lenox Dale
(Niagara Sta)
HOUSATONIC
Upper Res
Washington
Lower Reservoir
Commons
Brook
St Marys Sch
Lee
O C T O B E R
S T A T E

1-2-150-12

GEORGE H. McDONNELL
PHILIP W. SHERIDAN
EDWARD J. BAYON

TIGHE & BOND CONSULTING ENGINEERS
ENVIRONMENTAL SPECIALISTS

CIVIL, SANITARY AND ELECTRICAL ENGINEERING
INDUSTRIAL WASTES SOLID WASTES
INVESTIGATIONS, REPORTS, PLANS AND SPECIFICATIONS
SUPERVISION OF CONSTRUCTION AND OPERATION

ASSOCIATES
MICHAEL R. FINN
GERARD L'HEUREUX
EDWARD A. MOE
JOHN W. POWERS
DENNIS A. TRIPP

ELECTRICAL ASSOCIATE
GEORGE E. COYLE

LABORATORY DIRECTOR
GARY N. SWANSON

BOWERS AND PEQUOT STREETS
HOLYOKE, MASSACHUSETTS 01040
TEL. 413-533-3991

DEPARTMENT OF PUBLIC WORKS
DEPUTY CHIEF ENGINEER
WATERWAYS
RECEIVED MAY 5 1972
Referred To
Report back to
File

L-59
April 28, 1972

Board of Public Works
Town Office
Lee, Mass. 01238

Attn: J. Peter Scolforo, Superintendent

Gentlemen: Re: Inspection of Dams

The following is a brief letter-report on the results of the inspection of the three dams owned by the Town of Lee and operated by the Water Division of the Department of Public Works. The inspection was conducted on the afternoon of Wednesday, April 26th. Present at the inspection were: J. Peter Scolforo, Superintendent of Public Works, Lee; Robert Jordan, Dam and Reservoir Engineer, Mass. Department of Public Works; Dennis Tripp of Tighe & Bond, Inc., and the undersigned.

The inspection was made following the receipt of a communication by your Board from the Mass. Department of Public Works. Said communication pointed out certain conditions at the dams that might require attention and maintenance.

Based upon previous inspections of the dams by the undersigned in carrying on my routine duties for your Board, and based upon the inspection conducted April 26th, it is my opinion that all three dams are safe.

The three dams inspected were:

A. Lower Reservoir Dam, sometimes referred to as Codding Reservoir. #1-2-150-8

B. Middle Reservoir Dam, known generally as Vanetti Reservoir Dam. #1-2-150-9

C. Upper Reservoir Dam, also known as Leahey Reservoir Dam. #1-2-150-12

TIGHE & BOND CONSULTING ENGINEERS

(TIGHE & BOND'S COMMENTS ON THE LOWER & VANETTI RESERVOIR DAMS ARE OMITTED FROM THIS REPRODUCTION)

C. Upper Reservoir Dam 1-2-150-12

This dam was found to be in good condition and requires no maintenance at all. As has been the custom, the observation wells should be dunked this spring to determine the presence or absence of seepage water in the embankment.

In closing, as mentioned hereinbefore, it is my opinion that all three dams are safe, there is no need to lower water levels behind any of the dams and the routine repair work as suggested, at the two small dams, can be delayed until dry weather this summer for work at Codding Dam and the summer of 1973 for work at Vanetti Dam.

It is recommended that you send a copy of this letter-report to the Commonwealth of Mass., Department of Public Works, Division of Waterways, 100 Nashua Street, Boston, Mass. 02114, attention Fred C. Schwelm, P.E., Deputy Chief Engineer.

Very truly yours,

TIGHE & BOND, INC.

George H. McDonnell
Chief Engineer

GHM/amd

L-108

INSPECTION REPORT - DAMS AND RESERVOIRS

1. Location: City/Town LEE . Date No. 1-2-150-12 .

Name of Dam Upper Reservoir . Inspected by: RJJordan .

Date of Inspection 11/12/74 .

2. Prev. Inspection X .

Owner/s: per: Assessors .

Reg. of Deeds . Pers. Contact .

1. Town of Lee | Town Hall | Lee, MA
   Name | St. & No. | City/Town | State | Tel. No.

2. Name | St. & No. | City/Town | State | Tel. No.

3. Name | St. & No. | City/Town | State | Tel. No.

3. Caretaker [if any] e.g. superintendent, plant manager, appointed by absentee owner, appointed by multi owners.

Peter Scolforo | Town of Lee | Lee, MA | 243-2100
Name | St. & No. | City/Town | State | Tel. No.

4. No. of Pictures taken 3 .

5. Degree of Hazard: [if dam should fail completely]*

1. Minor . 2. Moderate .

3. Severe X . 4. Disastrous .

*This rating may change as land use changes [future development]

6. Outlet Control: Automatic . Manual X .

Operative X yes: no.

Comments:

Downstream face of Dam: Condition:

1. Good X . 2. Minor Repairs .

3. Major Repairs . 4. Urgent Repairs .

Comments:

L-168 A

DAM NO. 1-2-150-12

8. Downstream Face of Dam: Condition: 1. Good X. 2. Minor Repairs___.
3. Major Repairs___ 4. Urgent Repairs___.

Comments:_____

_____.

9. Emergency Spillway: Condition: 1. Good X. 2. Minor Repairs_____.
3. Major Repairs_____.4. Urgent Repairs___.

Comments:_____

_____

_____

10. Water level @ time of inspection: 15. ft. above_____. below X.
top of dam X.
principal spillway_____.
other_____.

11. Summary of Deficiencies Noted:

Growth [Trees and Brush] on Embankment NONE.
Animal Burrows and Washouts "
Damage to slopes or top of dam "
Cracked or Damaged Masonry "
Evidence of Seepage "
Evidence of Piping "
Erosion "
Leaks "
Trash and/or debris impeding flow "
Clogged or blocked spillway "
Other "

12. Remarks & Recommendations: [Fully Explain] PREVIOUS INSPECTION DATE: 4/26/72

Mr. Peter Scolforo, Supt., was present during inspection. This structure is very well maintained and continually monitored by the Town's consulting engineer's.

The embankments are in good condition, no sloughing or settlement was noted. The downstream toe is dry and stable. All interior drains are functioning properly.

In my opinion, the dam is safe

For location see Topo Sheet 2-D.

13. Overall Condition:

1. Safe X .
2. Minor repairs needed _____.
3. Conditionally safe - major repairs needed _____.
4. Unsafe _____.
5. Reservoir impoundment no longer exists [explain]

   Recommend removal from inspection list _____.

TIGHE & BOND/SCI

CONSULTING ENGINEERS
ENVIRONMENTAL SPECIALISTS

Edward J Bavon
Philip W Sheridan
Raymond C Murphy

David G Healey
John W Powers

Dennis H Bianchi
Thomas C Couture
Michael R Finn
Edward A Moe

L-110-00
September 29, 1978

Camp, Dresser & McKee, Inc.
1 Center Plaza
Boston, Massachusetts 02108

Attention: Mr. Roger Woods

Re: Lee, Massachusetts
Water Supply - Upper Dam

Gentlemen:

On Tuesday of this week, September 26, I made an inspection of the toe of the above subject dam and observed the amount of seepage. Seepage at the toe, in the general area of the old brook bed, was observed to be normal for this time of year. I estimate that the seepage I observed is about 30 percent of the seepage that occurs in the wet spring season of each year.

The undersigned is quite familiar with the Lee dam having designed the dam and supervised its construction.

In my opinion the water seeping from the toe is basically seepage water from the right side of the valley, downstream of the core, and this water comes from cracks and laminations in the ledge. The water enters the rock filled toe and trickles safely through the toe to emerge where it is observed.

Ever since the dam was built I have observed this seepage during my many inspections.

Very truly yours,

TIGHE & BOND/SCI

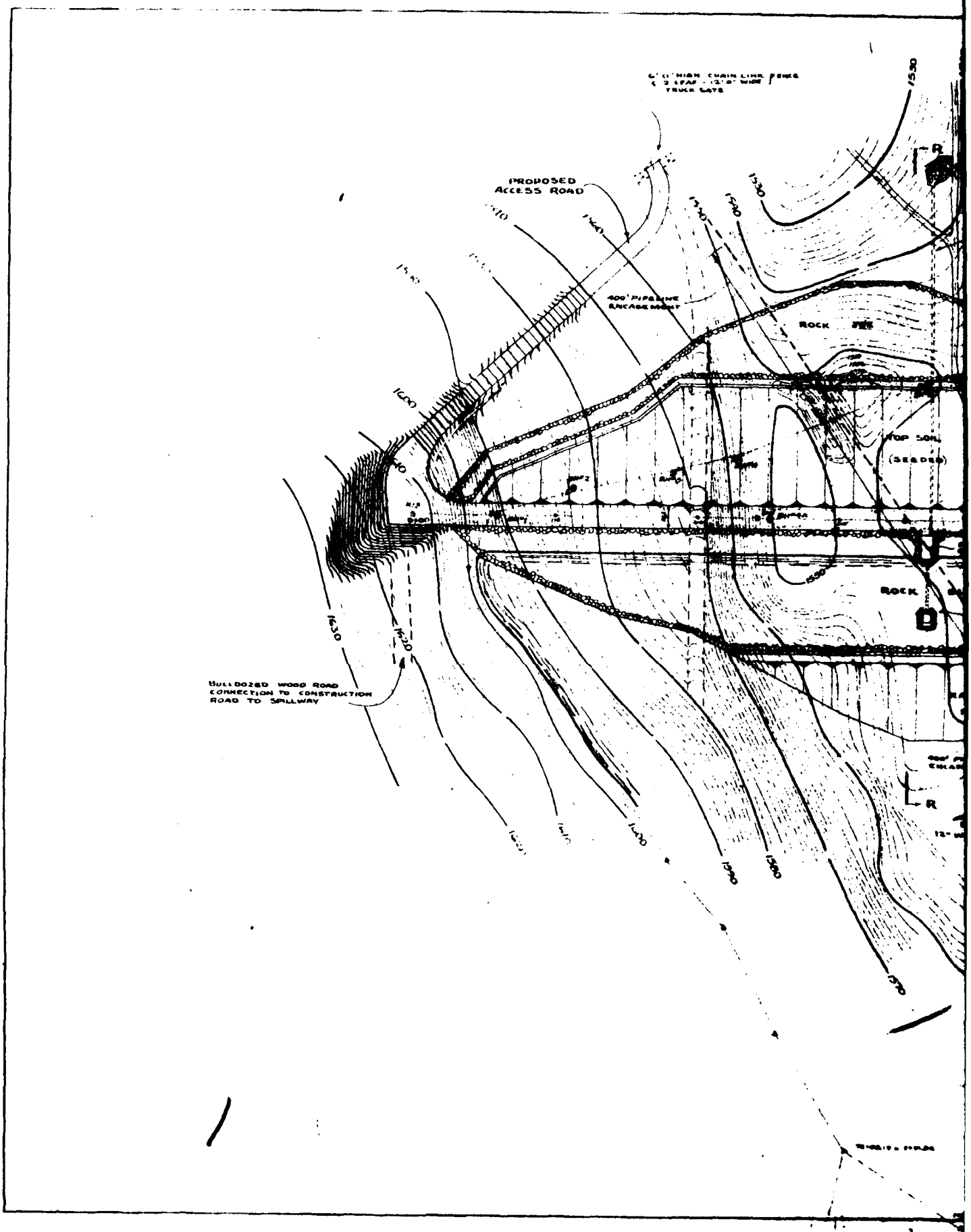
George H. McDonnell, P.E.
Consultant

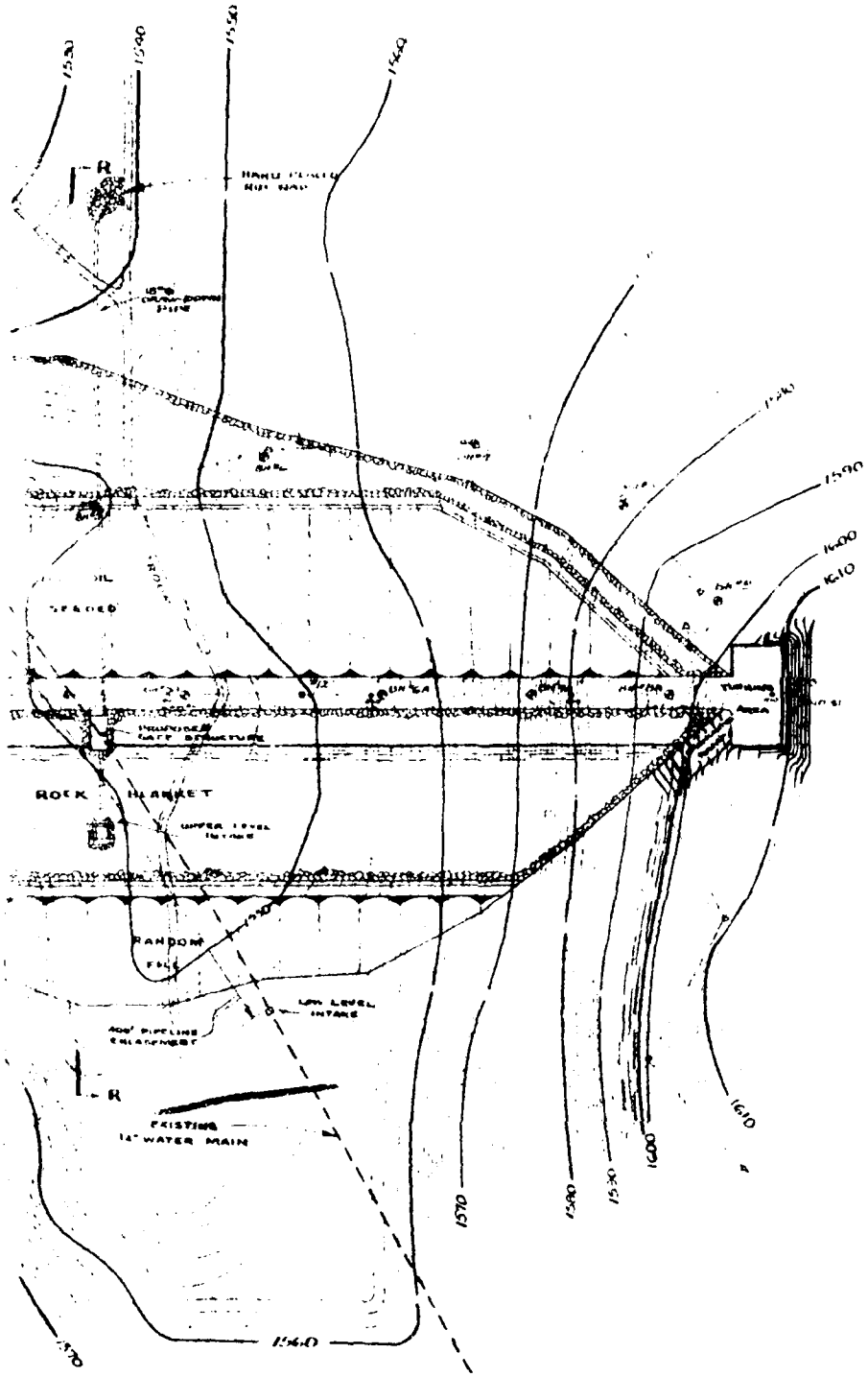
GHM/gg

Slopican Consultants
International Inc

Francis Associates
LeMessurier Associates
Tighe & Bond

50 Payson Avenue,
Easthampton, Mass. 01027
TEL. 413-527-5600
413-533-3991





RECORD PLAN

DRAWN BY		CHECKED BY	
TRACED BY		APPROVED BY	

NO	DATE	REVISIONS	BY
1	2-64	REVISED ROCK FOL	WML

DETAIL SITE PLAN
OF
EARTH EMBANKMENT AREA

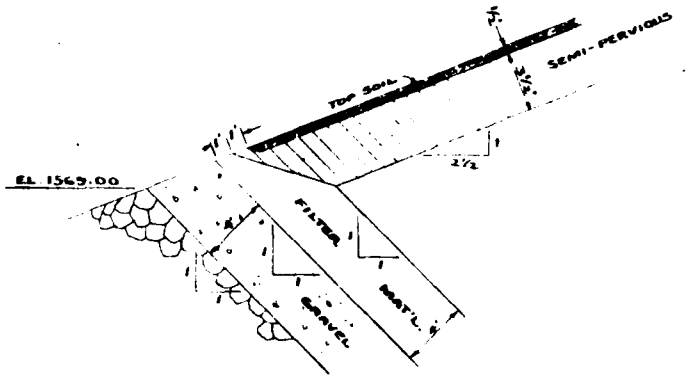
RESERVOIR & DAM
PROJECT P MASS 3139
BOARD OF WATER COMMISSIONERS
LEE WATER DEPARTMENT
LEE, MASS

TIGHE & BOND, CONSULTING ENGINEERS
HOLYOKE MASS

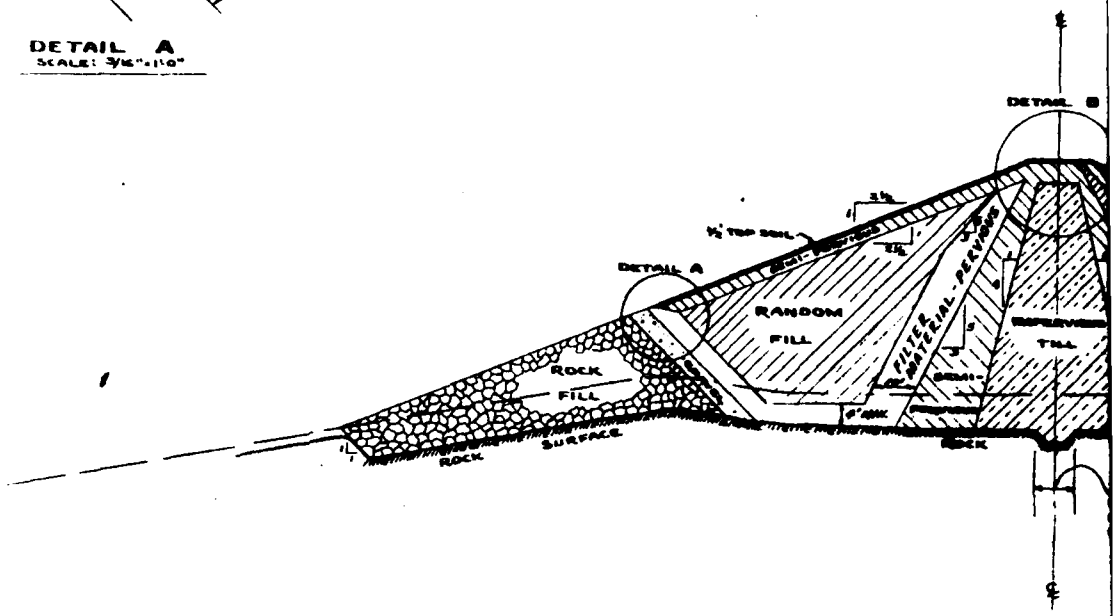
SCALE 1" = 40' DATE AUGUST, 1963

2

6



DETAIL A
SCALE: 3/16"=1'0"

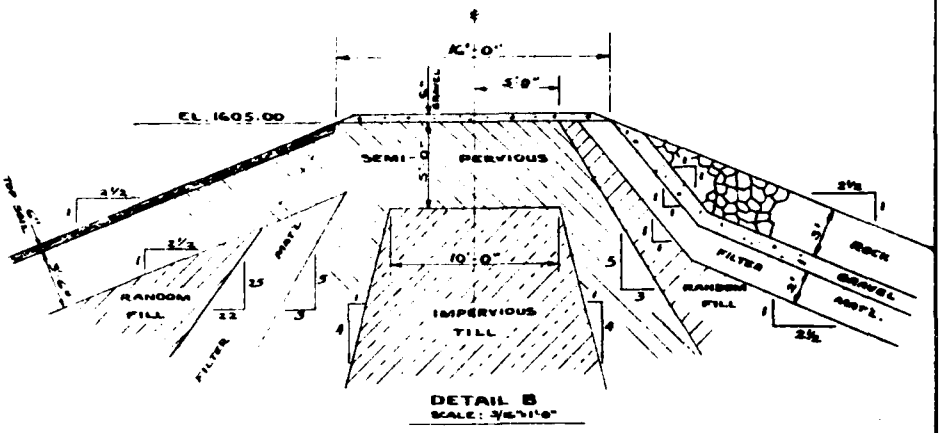


TYPICAL DAM
SCALE: 1"

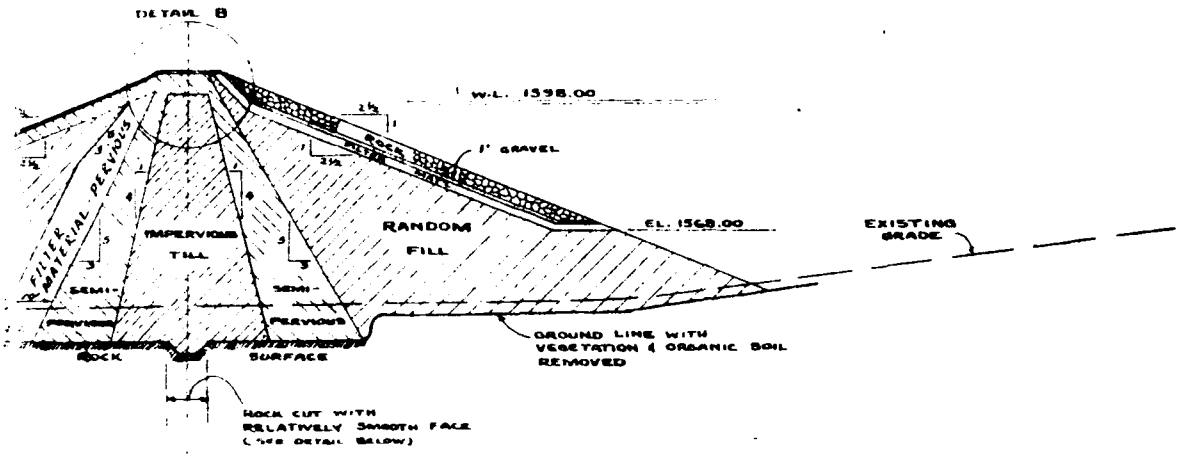
TYPICAL KEYWAY
FOR SMALL ROCK FILL AREAS
AT DOWNSTREAM TOE
SCALE: 1/8"=1'0"

TYPICAL KEYWAY
ALONG ℄ DAM
SCALE: 1/8"=1'0"

[redacted]



DETAIL B
SCALE: 1/8"=1'-0"



TYPICAL DAM SECTION
SCALE: 1"=20'

RECORD PLAN

DRAWN BY R.W.L.	CHECKED BY E.J.W.
TRACED BY	APPROVED BY G.H. MAYO.

NO.	DATE	REVISIONS	BY
1	12-68	REVISED FILTER ZONE	HMG

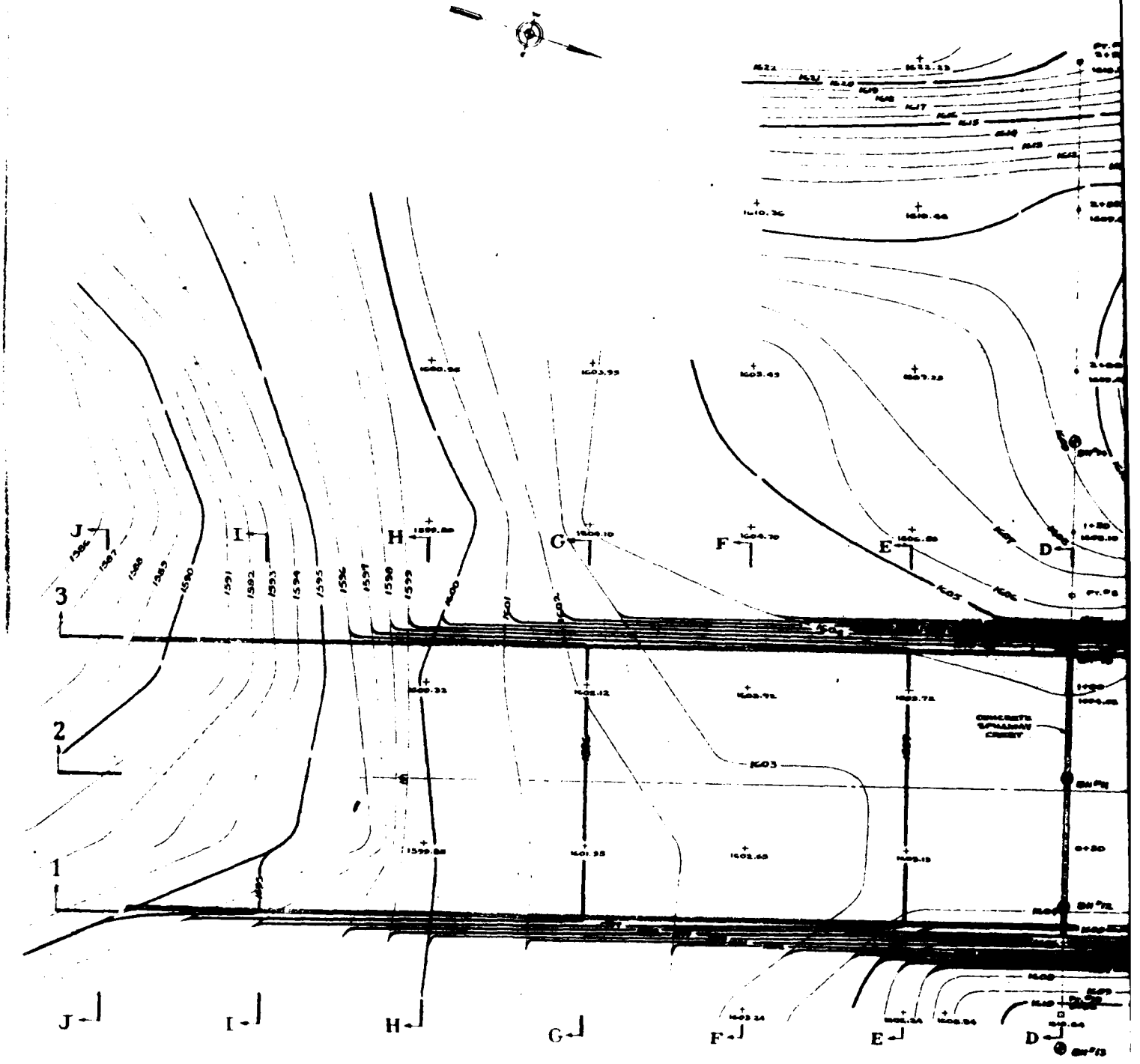
2

TYPICAL DAM SECTION

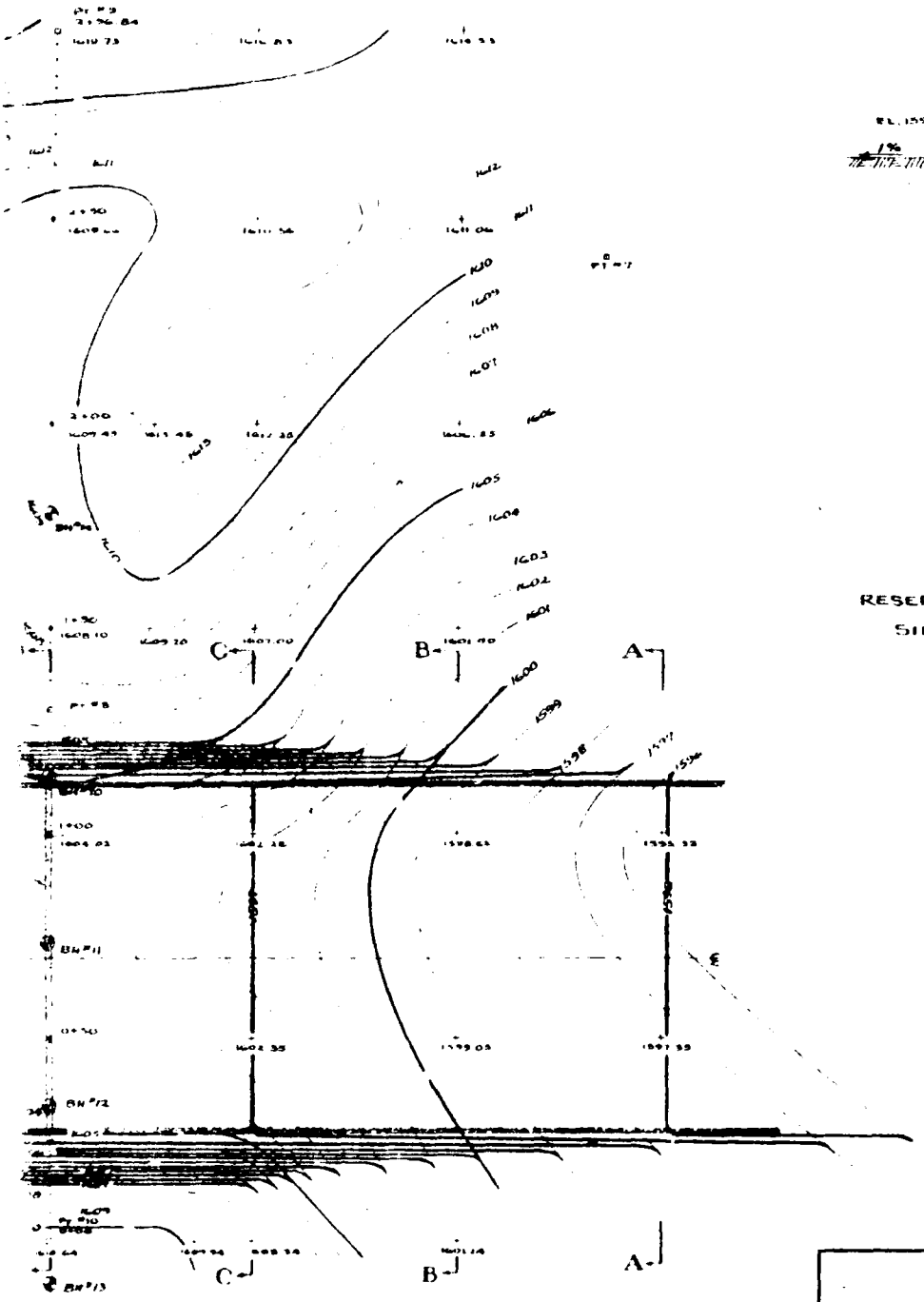
RESERVOIR & DAM
PROJECT P MASS - 3139
BOARD OF WATER COMMISSIONERS
LEE WATER DEPARTMENT
LEE, MASS.

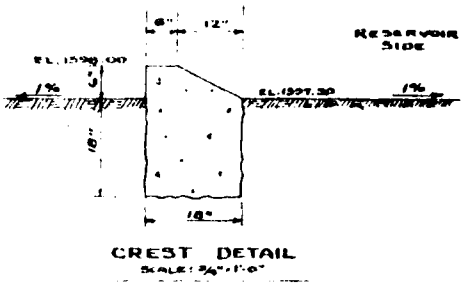
TIGHE & BOND, CONSULTING ENGINEERS
HOLYOKE MASS

SCALE AS NOTED DATE: AUGUST, 1963



REC





CREST DETAIL

3

2

1

DRAWN BY	CHECKED BY
TRACED BY	APPROVED BY

NO	DATE	REVISIONS	BY

DETAIL SITE PLAN OF SPILLWAY AREA

RESERVOIR & DAM

PROJECT: P MASS-3139

BOARD OF WATER COMMISSIONERS

LEE WATER DEPARTMENT

LEE, MASS.

TIGHE & BOND, CONSULTING ENGINEERS

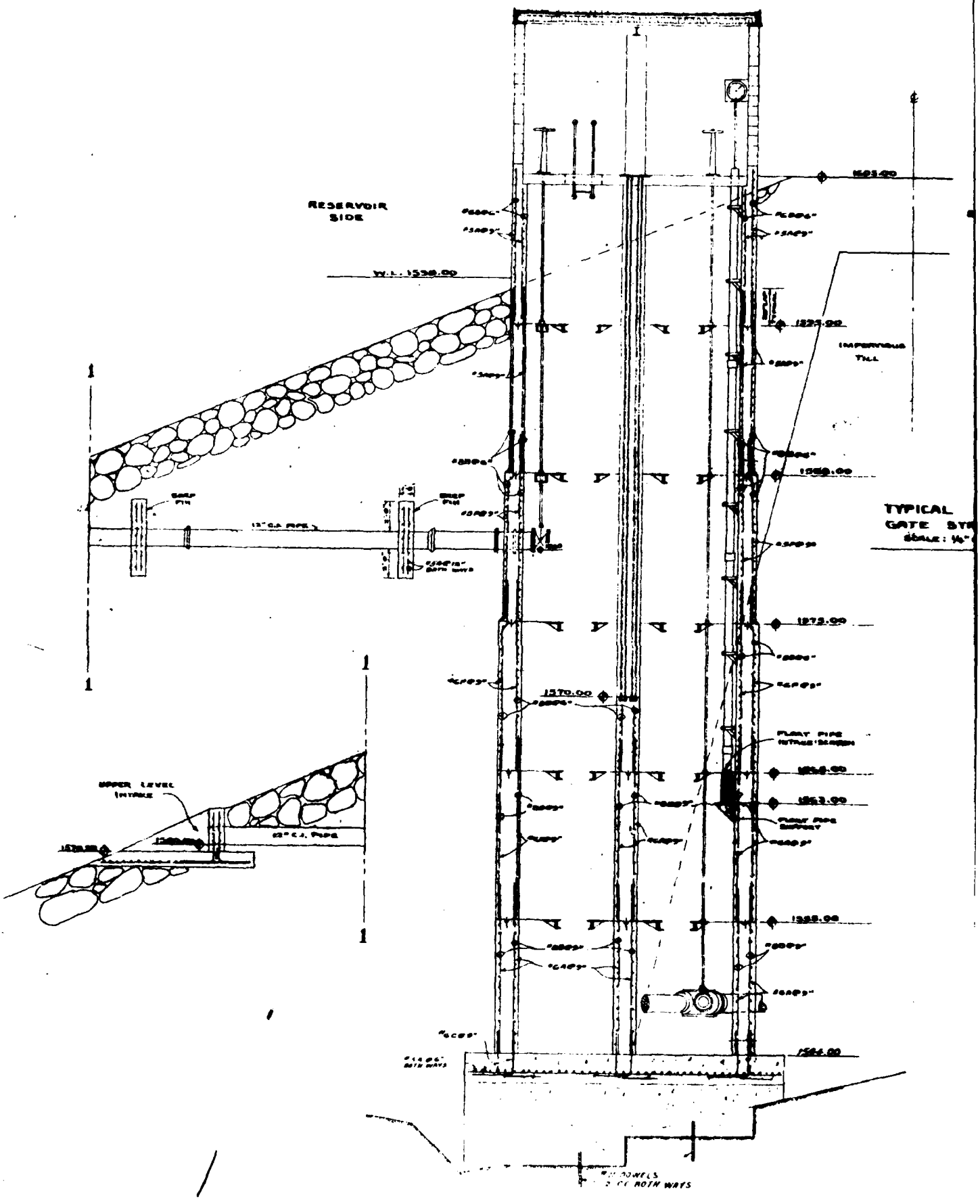
HOLYOKE, MASS

SCALE: 1" = 20' DATE AUGUST, 1963

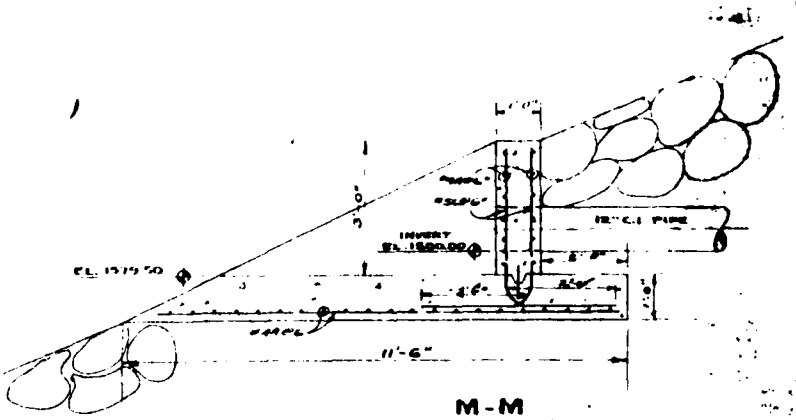
14

RECORD PLAN

2

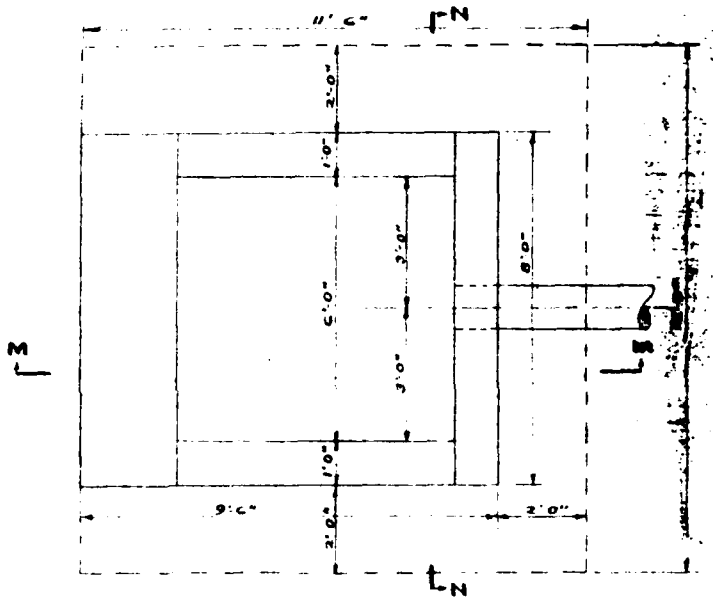


DOWNSTREAM SIDE

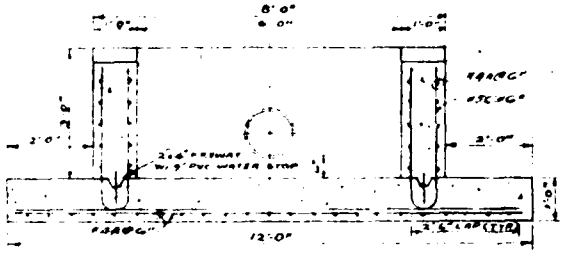


M-M

L SECTION
STRUCTURE
1/4"=1'-0"



PLAN
UPPER LEVEL INTAKE
SCALE: 1/2"=1'-0"



N-N

RECORD PLAN

DRAWN BY		CHECKED BY	
TRACED BY		APPROVED BY	

NO	DATE	REVISIONS	BY
1	12-64	CORRECTED GATE HOUSE BASE	HMG
2	12-64	REMOVED LADDERS & LANDINGS	"

2

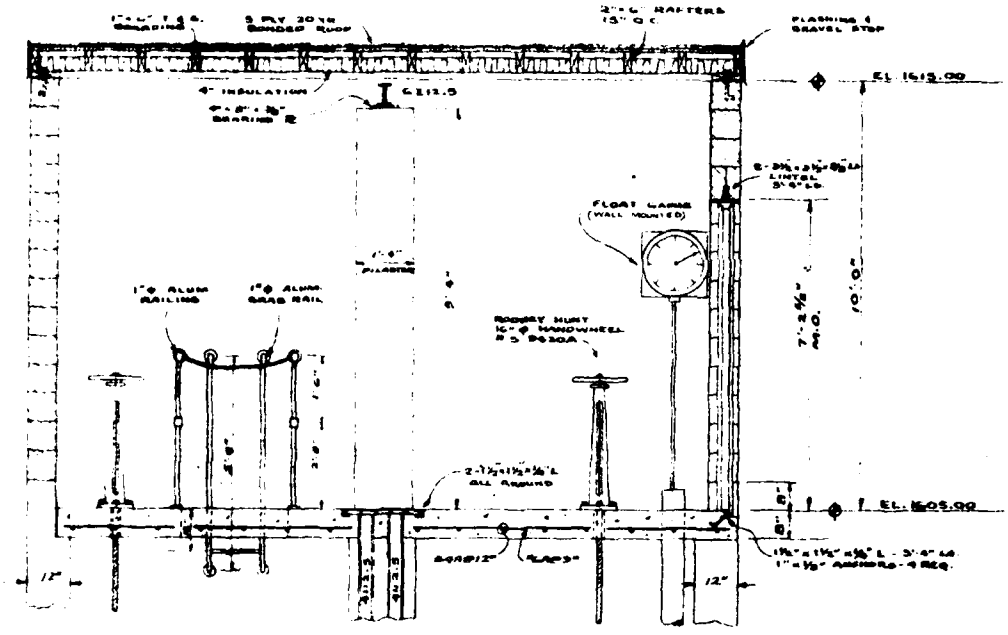
GATE STRUCTURE SECTION
&
CONSTRUCTION DETAILS

RESERVOIR & DAM
PROJECT P MASS - 3139
BOARD OF WATER COMMISSIONERS
LEE WATER DEPARTMENT
LEE, MASS.

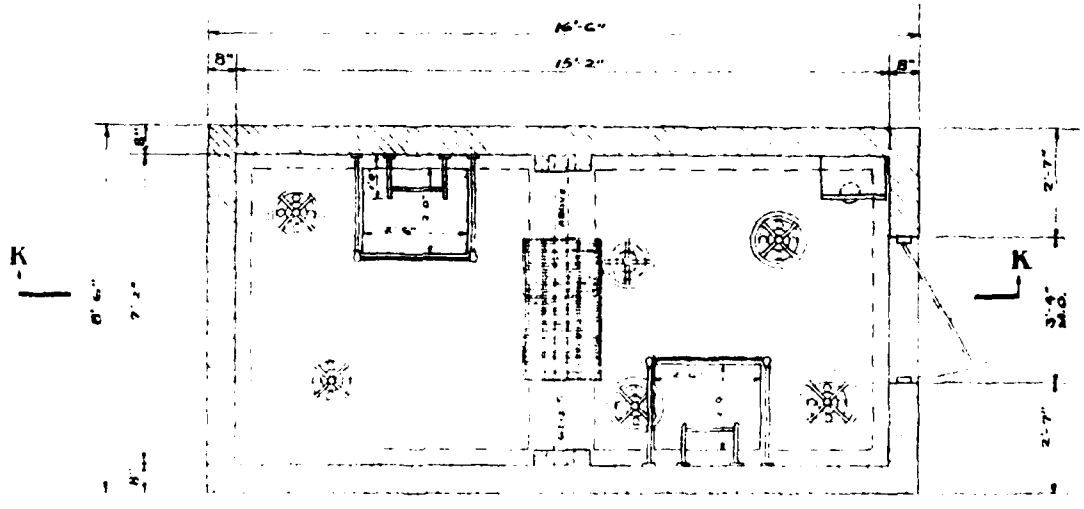
TIGHE & BOND, CONSULTING ENGINEERS
HOLYOKE MASS

SCALE: AS NOTED DATE: August, 1963

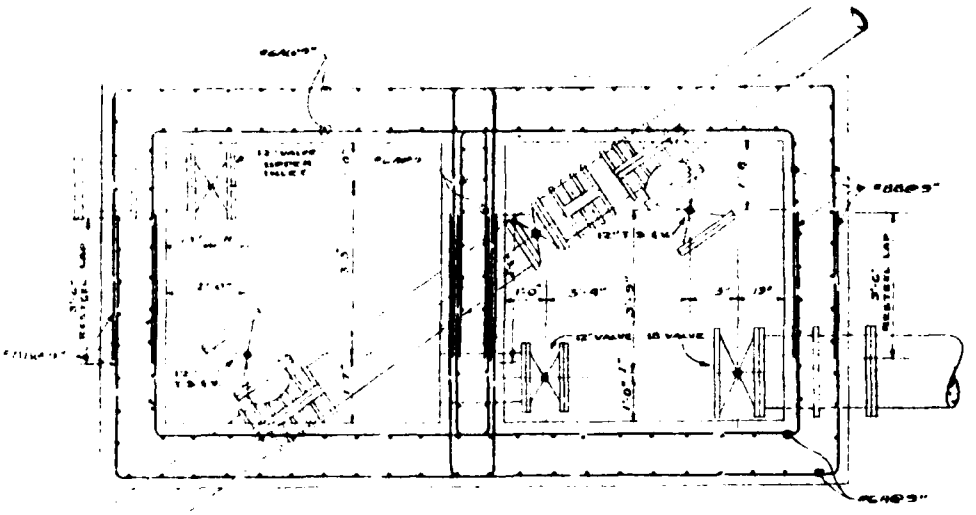
19



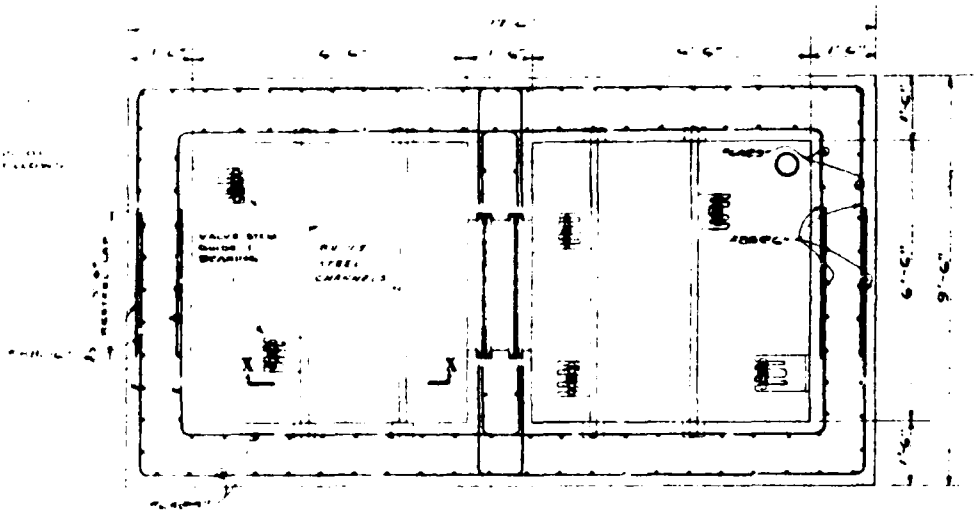
SECTION K-K
SCALE: 1/2"=1'-0"



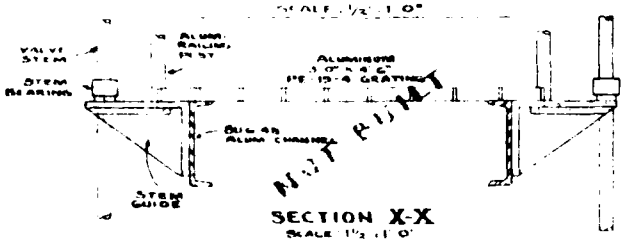
FLOOR PLAN OF GATE HOUSE
SUPER STRUCTURE
SCALE: 1/2"=1'-0"



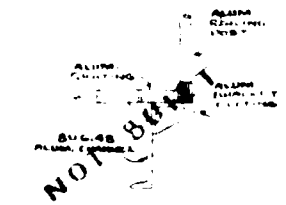
BASE FLOOR PLAN



PLAN OF TYPICAL PLATFORM (EL. 1570-1575)



SECTION X-X



DETAIL OF BRACKET FITTING FOR RAILING POST

RECORD PLAN

DRAWN BY	CHECKED BY
TRACED BY	APPROVED BY

NO	DATE	REVISIONS	BY
1	2-64	MOVED 12" IN LIVE VALVE TO DOWNSTREAM CHAMBER	
2	2-64	DELETED ALUM. HAND RAILINGS & ADDED GUARD RAILS	

GATE HOUSE SECTION
&
GATE STRUCTURE PLANS AND DETAILS

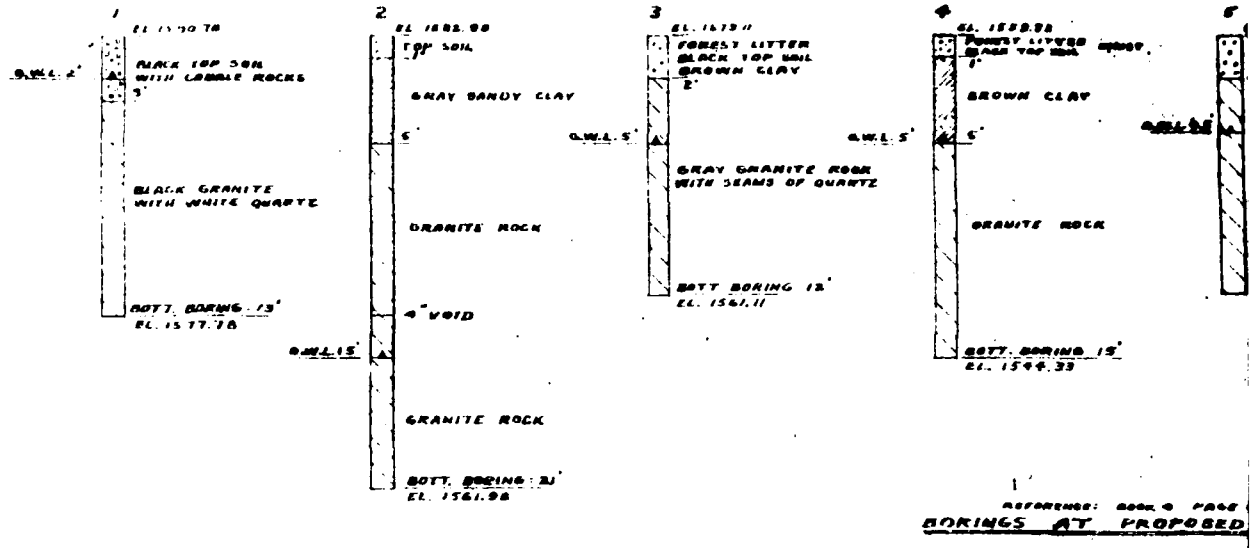
RESERVOIR & DAM
PROJECT P MASS 31.39
BOARD OF WATER COMMISSIONERS
LEE WATER DEPARTMENT
LEE, MASS.

TIGHE & BOND, CONSULTING ENGINEERS
HOLYOKE MASS

SCALE AS NOTED DATE AUGUST 1963

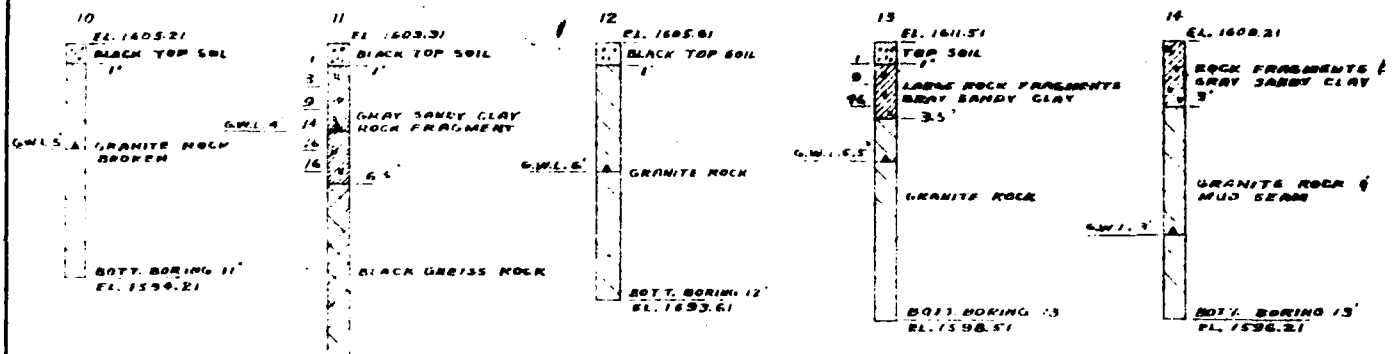
20

2



REFERENCE: BOOK 4 PAGE

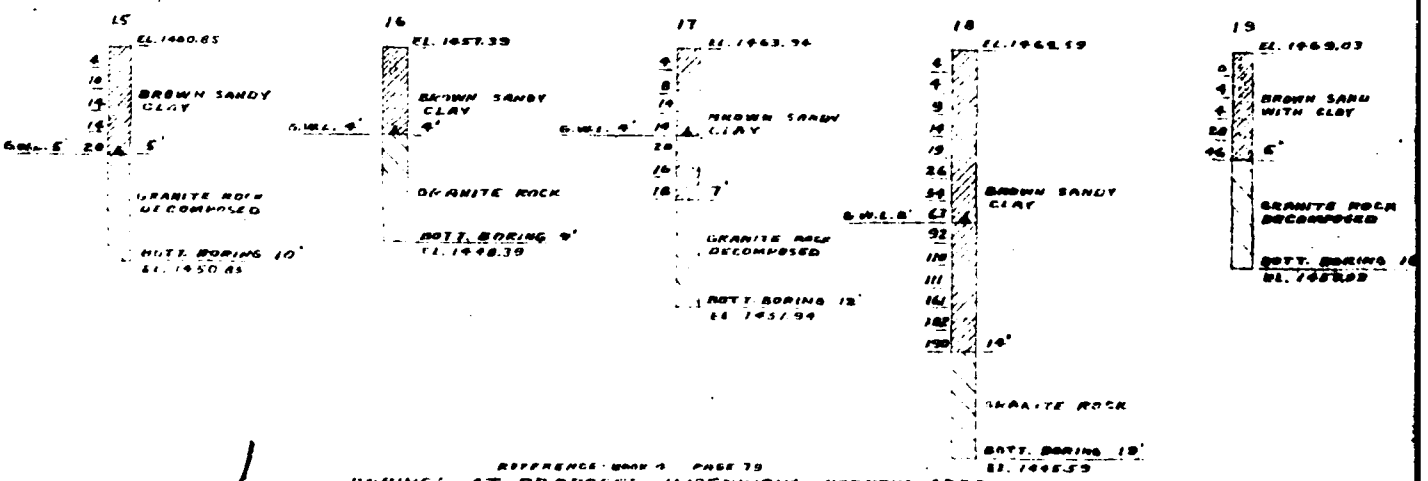
BORINGS AT PROPOSED



REFERENCE: BOOK 4 PAGE 78

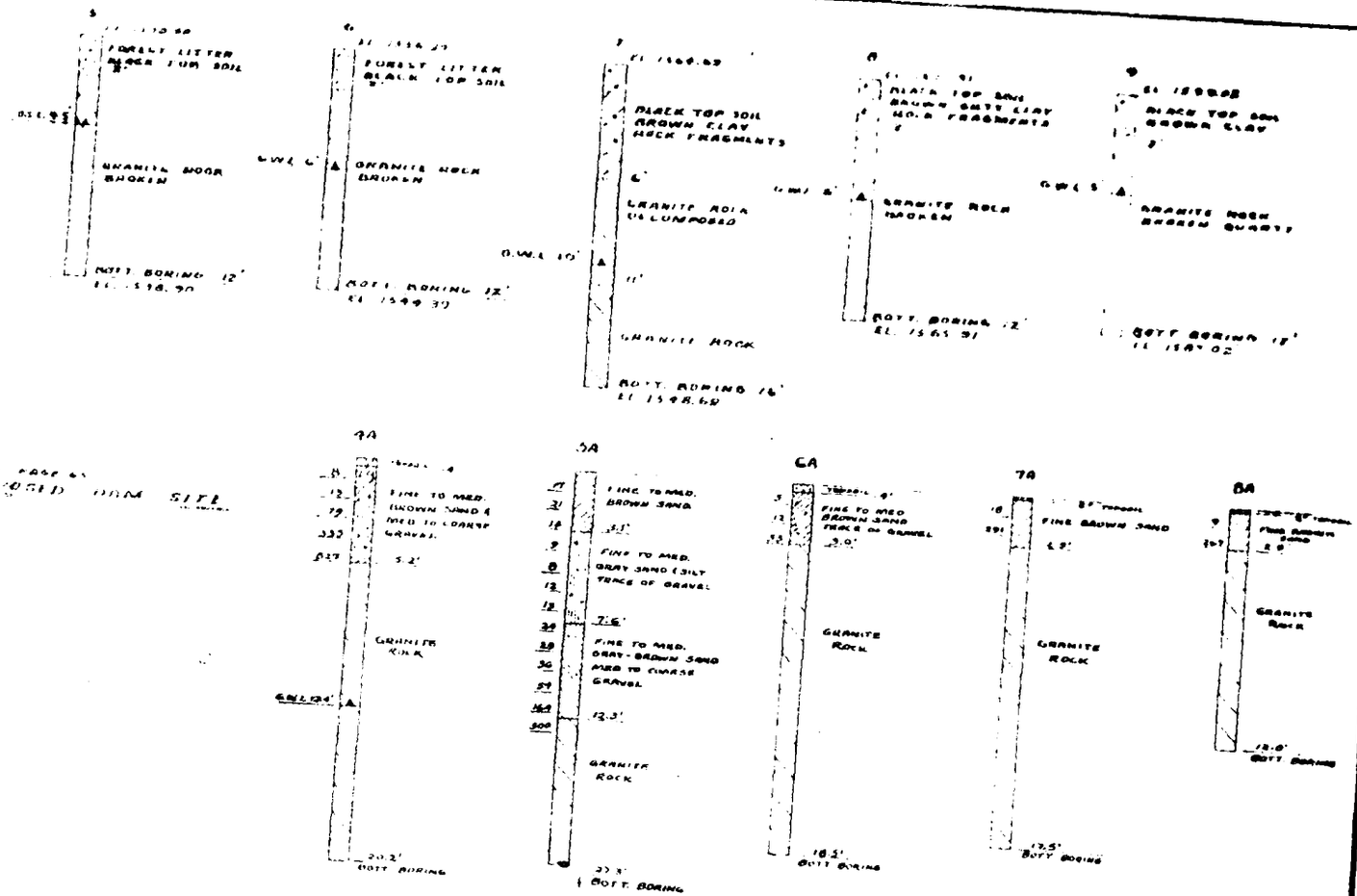
BORINGS AT PROPOSED SPILLWAY

NO
CO
OF
BL

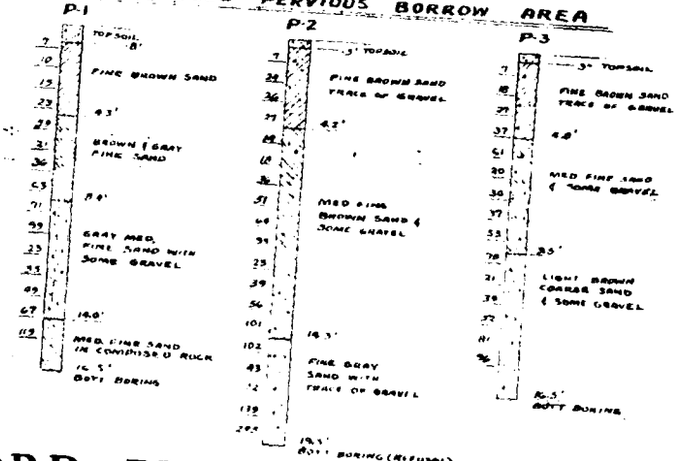


REFERENCE: BOOK 4 PAGE 79

BORINGS AT PROPOSED IMPERVIOUS BORROW AREA



BORINGS AT PROPOSED PERVIOUS BORROW AREA



NOTE:
COLUMN OF FIGURES ON LEFT SIDE OF BORING INDICATES CASING BLOWS PER FOOT.

RECORD PLAN

DRAWN BY W.F.	CHECKED BY G.H.M.
TRACED BY W.F.	APPROVED BY G.H.M.

NO	DATE	REVISIONS	BY

BORINGS

RESERVOIR & DAM
PROJECT: P-MASS 3139
BOARD OF WATER COMMISSIONERS
LEE WATER DEPARTMENT
LEE, MASS.

TIGHE & BOND, CONSULTING ENGINEERS
HOLYOKE, MASS.

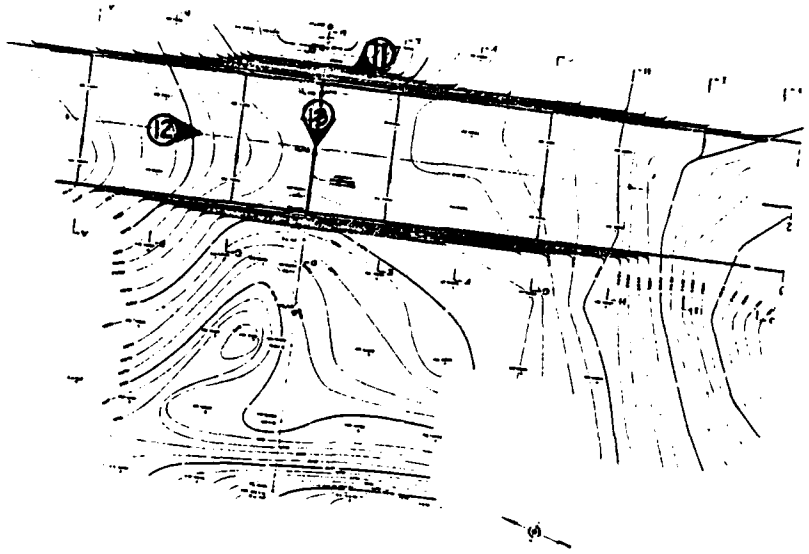
SCALE: 1/4" = 1'-0" DATE: AUGUST, 1963

(5)

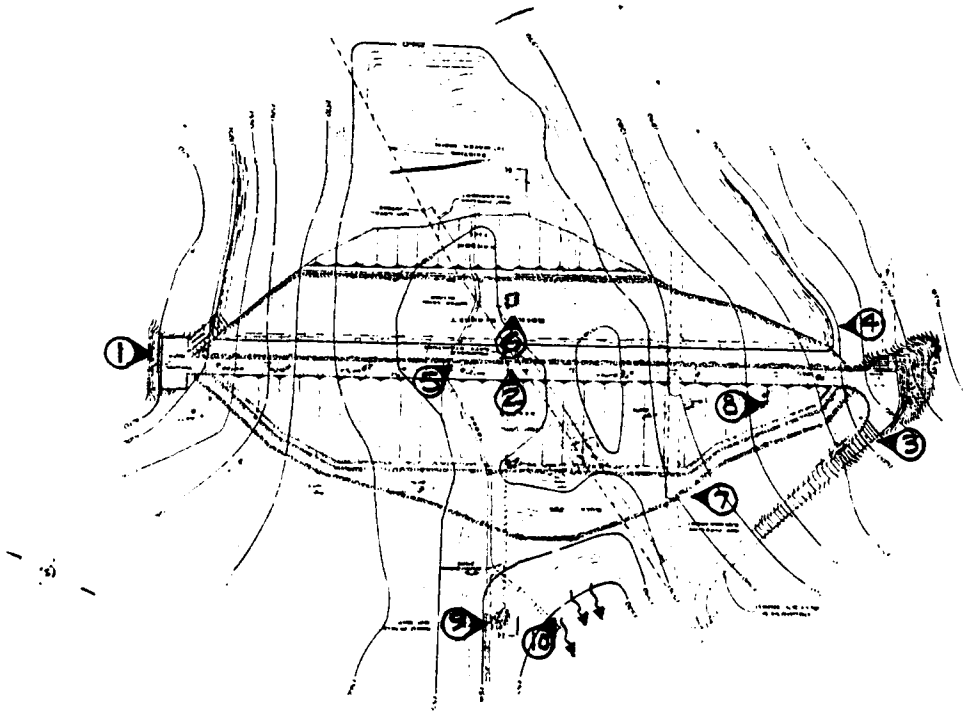
2

APPENDIX C

SELECTED PHOTOGRAPHS OF PROJECT



SPILLWAY



DAM

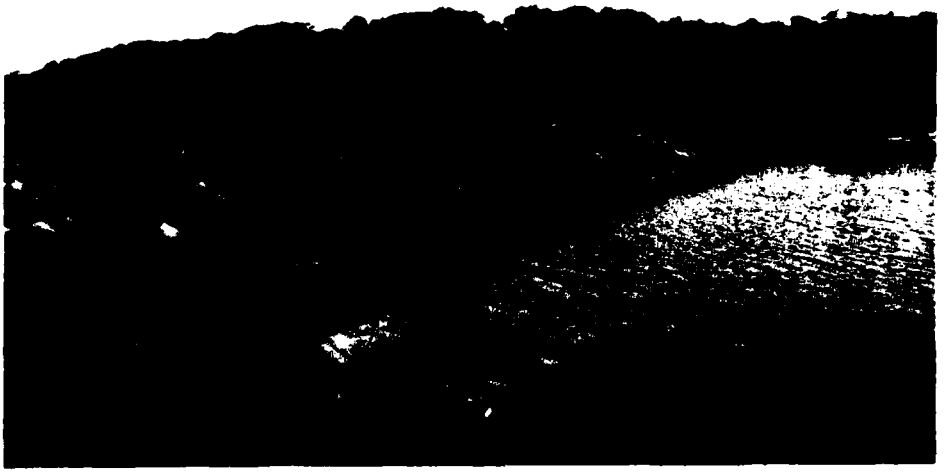
Note: ◯▸ denotes direction of view and photograph number.

~▸ denotes observed location of apparent seepage.

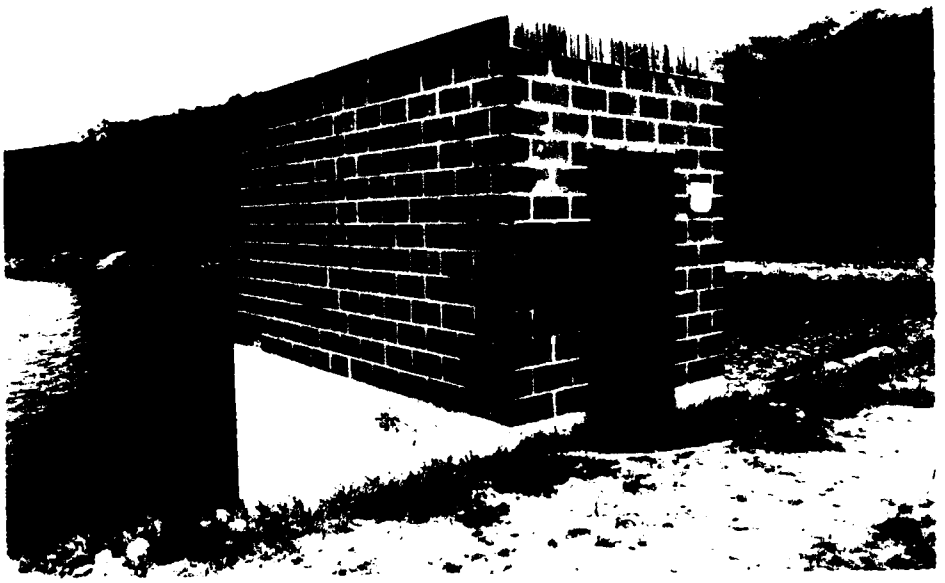
NATIONAL PROGRAM OF INSPECTION
OF NON FEDERAL DAMS
LOCATION OF PHOTOGRAPHS

LEAHEY DAM
LEAHEY RESERVOIR MASSACHUSETTS

3. OVERVIEW OF DAM FROM LEFT ABUTMENT.



4. RIPRAP ON UPSTREAM FACE OF DAM NEAR LEFT ABUTMENT.



5. GATE HOUSE AT UPSTREAM FACE OF DAM.

6. INTERIOR OF GATE HOUSE.

7. ROCK AT THE TOE OF DAM.

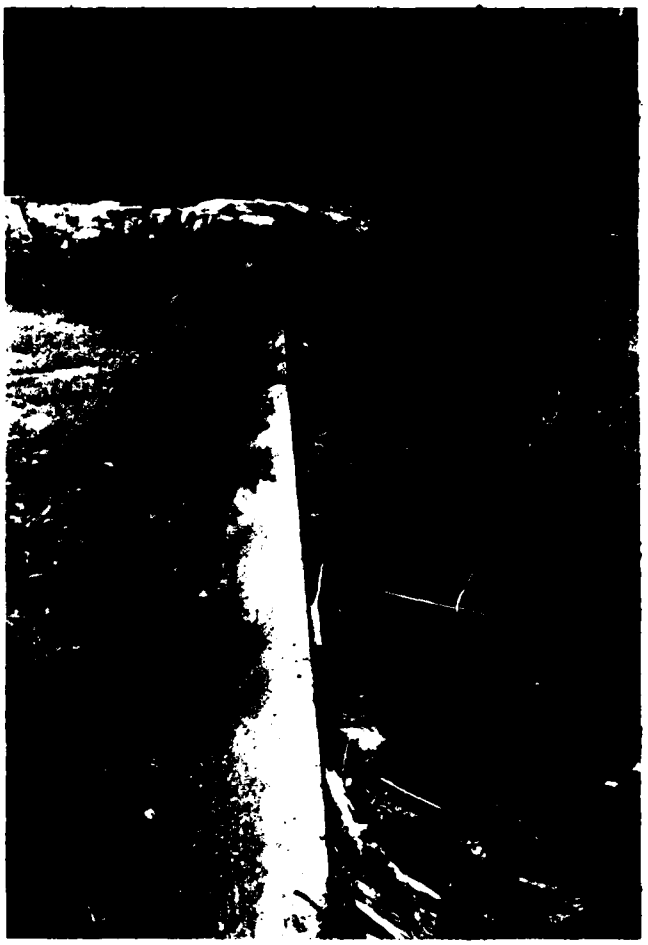
8. OBSERVATION WELL IN DOWNSTREAM FACE OF DAM NEAR LEFT ABUTMENT.

9. BLOWOFF PIPE OUTLET DOWNSTREAM OF DAM.

10. WATER FLOWING FROM BENEATH DEAD TREE TRUNK DOWNSTREAM OF DAM.

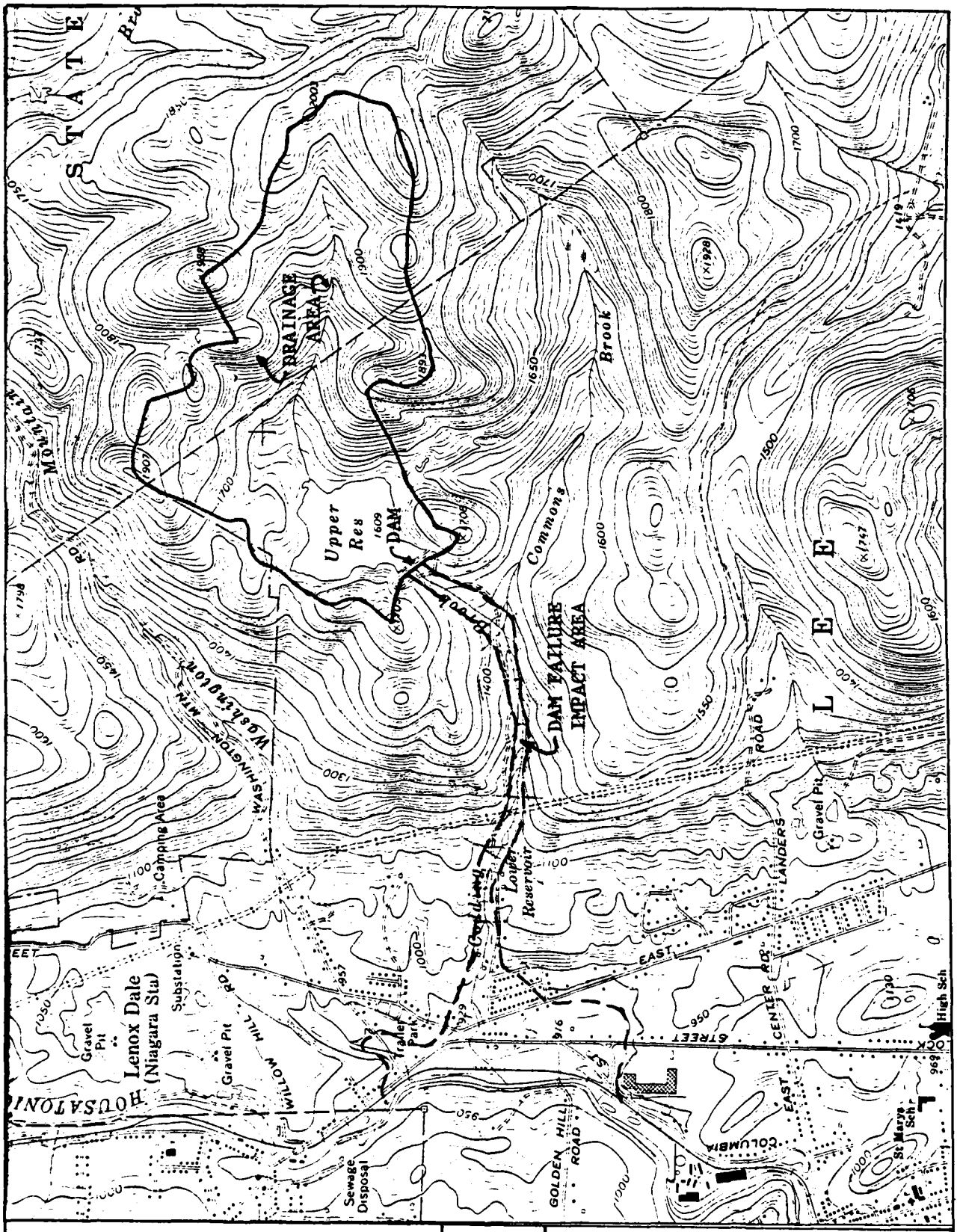
11. UPSTREAM END OF SPILLWAY. SPILLWAY WEIR IS VISIBLE IN LOWER LEFT CORNER OF PHOTOGRAPH.

12. VIEW OF SPILLWAY FROM APPROACH CHANNEL.



13. VIEW OF CONCRETE WEIR FROM RIGHT SIDE OF SPILLWAY.

APPENDIX D
OUTLINE OF DRAINAGE AREA AND HYDRAULIC COMPUTATIONS



DAM LEAHEY (UPPER) RESERVOIR DAM

IDENTIFICATION NO. MA 00265

DRAINAGE AREA MAP
USGS QUADRANGLE
EAST LEE, MA.

APPROX. SCALE 1" = 2000'

APPENDIX D-1

CAMP DRESSER & McKEE
Environmental Engineers
Boston, Mass.

CLIENT
PROJECT LEAHEY
DETAIL UPPER RESERVOIR (5) EAST LEE, MA. QUAD

JOB NO. 280-5-5
DATE CHECKED 1-15-79
CHECKED BY

PAGE 1 of 10
DATE 8/11/78
COMPUTED BY PAE

Scale of Mapping: 1"=2000'. ∴ #Sq. in. x 91.83 = #Acres (A)

#A ÷ 640 = #mi²

DRAINAGE AREA

1. 4.79
2. 9.50
> 4.71 Ave = 4.75 in² = 436.2 A = 0.682 mi²

WATER SURFACES

EL. 1609

1. 0.47
2. 0.91
> 0.44 Ave = 0.46 in² = 42.2 A = 0.065 mi²

EL. 1610

1. 0.60
2. 1.20
> 0.60 in² = 55.1 A = 0.086 mi²

EL. 1620

1. 0.75
2. 1.50
> 0.75 in² = 68.9 A = 0.108 mi²

CAMP DRESSER & McKEE
Environmental Engineers
Boston, Mass.

CLIENT
PROJECT
DETAIL Leahy (Upper)

JOB NO. 380-5-5
DATE CHECKED 19 Sept 1978
CHECKED BY [illegible]

PAGE 24-10
DATE 19 Sept 1978
COMPUTED BY JW

Size Classification

Hydraulic Height = 57 ft — Intermediate

Storage 880 ac-ft — Small

∴ Leahy (Upper) is classified as Intermediate

Hazard Potential

High

Test Flood

½ PMF to PMF

Drainage Area

.682 mi²

basin has steep side slopes toward stream. Stream also has a steep average slope (≈ 7.6% or 400 ft/mile)

∴ use Mountainous Curve to determine PMF

PMF

from Mountainous curve and A = 0.682 mi²

$Q = (2925 \text{ cfs/mi}^2)(.682)$

$= 1994 \text{ cfs}$ SAY 2000 cfs

PMF = 2000 cfs

½ PMF = 1000 cfs

CAMP DRESSER & McKEE
Environmental Engineers
Boston, Mass.

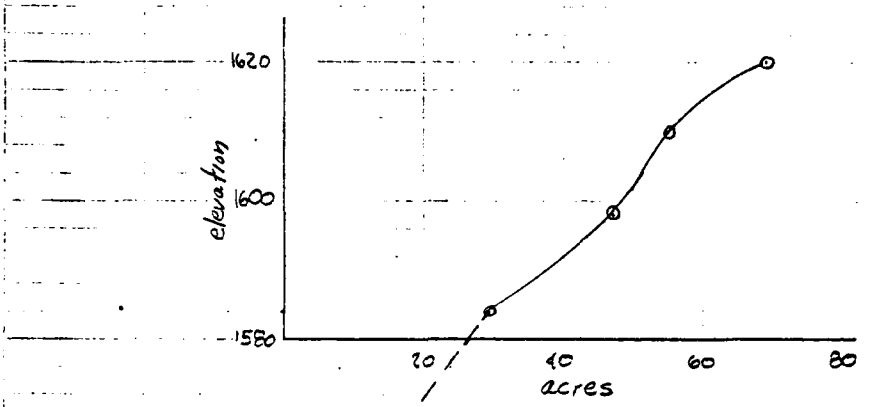
CLIENT Corps of Engineers JOB NO. 380-5-5 PAGE 3 of 10
PROJECT DATE CHECKED 1-15-79 DATE 19 Sept 1978
DETAIL Leahy (Upper) Reservoir CHECKED BY [illegible] COMPUTED BY JW

Elevations

EL	Area
1584	29 acres (old spillway)
1598	47.1 acres (new spillway)
1610	55 acres
1620	69 acres

Drainage Area

436 acres
= .68 mi²



1560

1540

Spillway crest el 1598

Top of dam 1605
Toe of dam 1544*

Storage at Spillway crest: 880 Ac-ft

* Because of width of dam & steepness of existing ground which dam is built on, use elevation @ midwidth of dam

CAMP DRESSER & McKEE
Environmental Engineers
Boston, Mass.

CLIENT Corps of Engineers
PROJECT LEAHEY UPPER
DETAIL

JOB NO. 380-5-5
DATE CHECKED 1-18-79
CHECKED BY

PAGE 4 of 10
DATE 19 JAN 79
COMPUTED BY

STORAGE

el	Area	Ht	Storage	
1548	0 acres	0 ft	0 ac-ft	based on construction plans
1584	29	36	348	
1598	47.1	50	880	
1610	55.	62	1492	

1548	0	0	0	based on plaque statement of 240,000,000 gal @ el 1598
1584	29	36	204	
1598	47.1	50	737	
1610	55	62	1350	

240,000,000 gal ≡ 737 Ac-ft = storage at el 1598

storage @ el 1584:

$737 - \left[\left(\frac{47.1+29}{2}\right)(50-36)\right] = 204$ ac ft

Storage @ el 1598 = 737

@ el 1610:

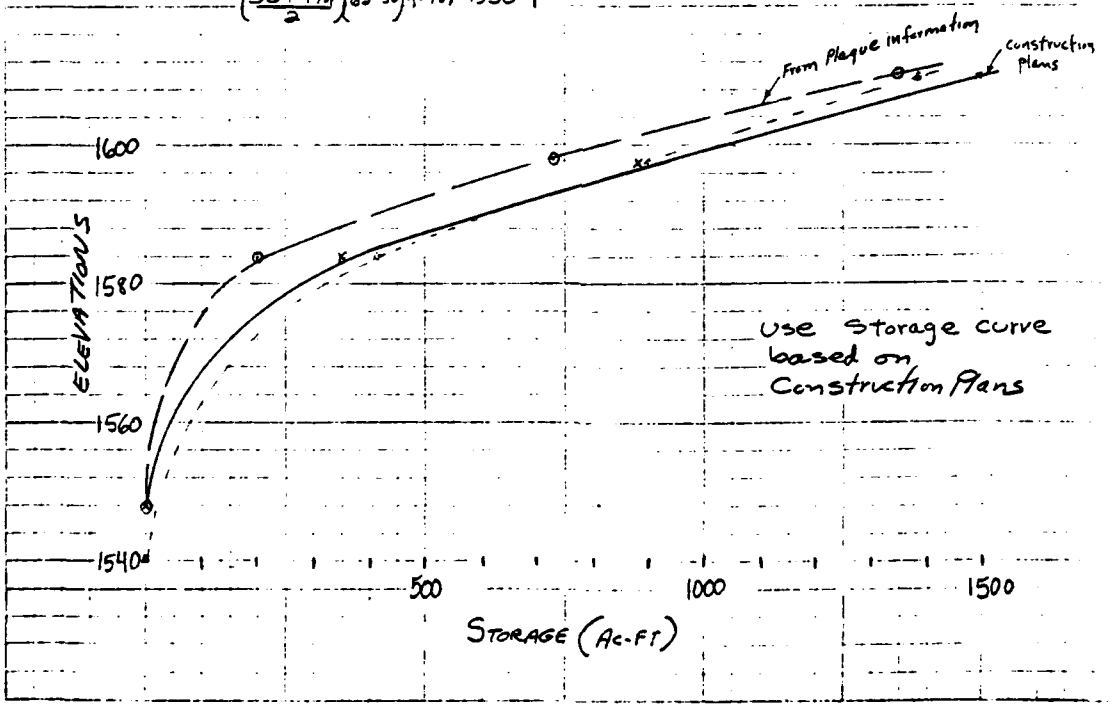
$\left(\frac{55+47.1}{2}\right)(62-50)+737 = 1350$

Based on Information From Construction Plans

Storage @ el 1584: $\left(\frac{29\text{ Ac}}{3}\right)(36\text{ ft}) = 348$ Ac-ft

@ el 1598: $\left(\frac{47.1+29}{2}\right)(50-36\text{ ft})+348 = 880$ Ac-ft

@ el 1610: $\left(\frac{55+47.1\text{ Ac}}{2}\right)(62-50\text{ ft})+880 = 1492$ Ac-ft



CAMP DRESSER & McKEE
Environmental Engineers
Boston, Mass.

CLIENT COE
PROJECT
DETAIL Leach (Upper) Res.

JOB NO. 380-5-5
DATE CHECKED 1-15-79
CHECKED BY [illegible]

PAGE 5 of 10
DATE 20 Sept 1978
COMPUTED BY JW

DAM FAILURE ANALYSIS

$Q_{P_1} = \frac{8}{27} W_b \sqrt{g}\, Y_o^{3/2}$

(as w.s. will not reach top of dam because of piping → spillway, assume w.s. ½ way between top of dam & spillway crest)

Assume Dam fails at el 1601. S = 1050 Ac-Ft

$L = 550$ ft 40% L = 220 ft = W_b

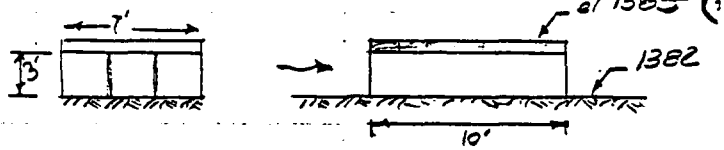
Y_o = 1601 − 1544 = 57

$Q_{P_1} = \left(\frac{8}{27}\right)(220)\sqrt{32.2}\,(57)^{3/2}$

= 160,000 cfs

FIRST DOWNSTREAM CULVERT (#1)

el 1385 (from USGS Map)



Assume S = 0.100 n = 0.03

$Q = \frac{1.486}{0.03} A R^{2/3} S^{1/2}$

for w.s. el 1065
A = 21
WP = 20
R = 1.05

$= \left(\frac{1.486}{0.03}\right)(21)(1.05)^{2/3}(.1)^{1/2}$

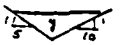
= 340 cfs <<< 160,000 cfs ∴ weir flow → ratio pressure flow

As full flow capacity of culvert is so small compared to dam failure flow, estimate flow depth just upstream of crossing as an open channel flow to estimate height of water over road.

$Q = \frac{1.486}{0.03} A R^{2/3} (.13)^{1/2}$

assume: n = 0.04
S = .13

$AR^{2/3} = 8960$



let y = 17 $AR^{2/3} = (7.5)(17)^2\left[\frac{(7.5)(17)^2}{\sqrt{101(17)^2} + \sqrt{26(17)^2}}\right]^{2/3}$

$A = \left(\frac{1}{2}\right)10y + \left(\frac{1}{2}\right)5y^2 = 7.5y^2$

$WP = \sqrt{101y^2} + \sqrt{26y^2}$

$R = \left[\frac{7.5y^2}{\sqrt{101y^2} + \sqrt{36y^2}}\right]^{2/3}$

= 8968 OK

Flood depth is about 17ft over road

CAMP DRESSER & McKEE
Environmental Engineers
Boston, Mass.

CLIENT COE
PROJECT
DETAIL Leahy (Upper) Rec.

JOB NO. 380-5-5
DATE CHECKED 1-15-79
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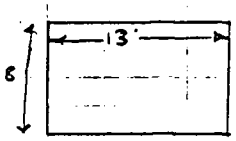
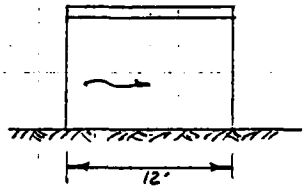
DATE 20 Sept 1978
COMPUTED BY JW

Crossing #2





assume: $n = 0.03$
$S = 0.10$

$A = 104$ $R = 2.48$
$wp = 42$

$Q = \frac{1.486}{.03}(104)(2.48)^{2/3}(.1)^{1/2}$

$Q = 2982$ cfs $\ll$ 160,000 cfs

2982 cfs is 1.9% of future flow

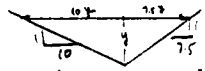
As with crossing #1, estimate flow depth just upstream of crossing

$Q = 1.566 AR^{2/3}$

$AR^{2/3} = 10215$

$(8.75y^2)(.4966y)^{2/3} = 10215$

$n = .03$
$S = 0.10$
$Q = 160,000$

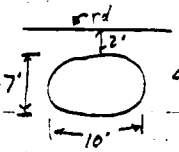


$A = (\frac{1}{2})1.5y^2 + \frac{1}{2}10y^2 = 8.75y^2$
$wp = \sqrt{57.25y^2} + \sqrt{101y^2} = 17.62y$
$R = .4966y$

Let $y = 17$	$= 10484$
16	$= 8919$

$y \approx 16.8$ Flood depth is about 16.8 ft over road

Crossing #3 East St



$L = 25$ $A \approx 55$ sf
$wp \approx 28$ $S = 0.014$ } assumed
$R = 1.96$ $n = .03$ }

$Q = \frac{1.486}{.03}(55)(1.96)^{2/3}(.014)^{1/2} = 506$ cfs $\ll\ll$ 160,000 cfs

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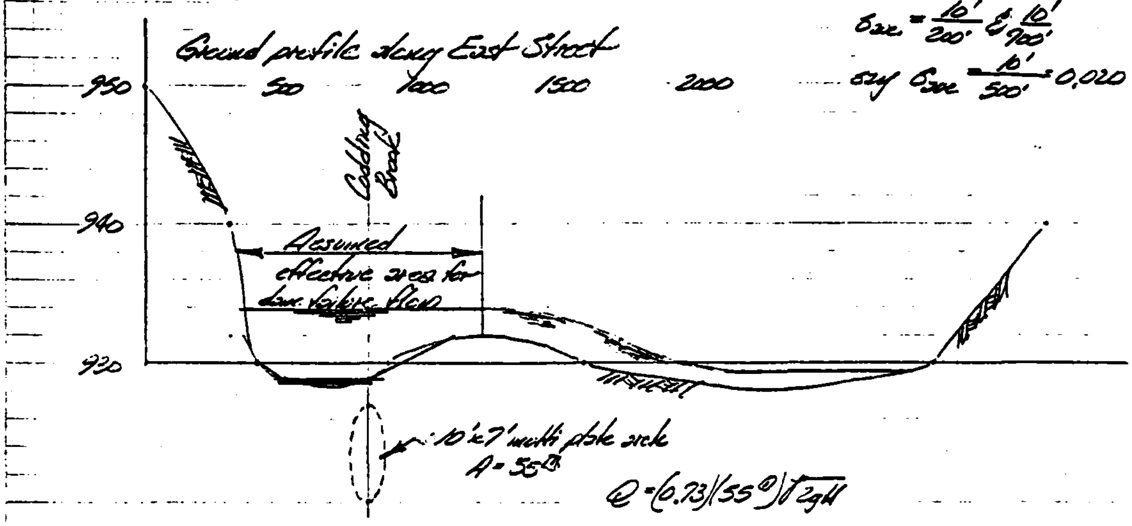
Environmental Engineers
Boston, Mass.

CLIENT: Corps of Engineers - Dam Inspect. JOB NO. 380-5-5 PAGE 7 of 10
PROJECT: DATE CHECKED 1-19-79 DATE Jan. 16, 1979
DETAIL: Leadmine (Upper) Res. CHECKED BY JED COMPUTED BY

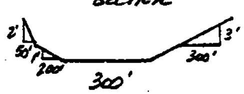
Crossing No. 3 (East Street)

$S_{av} = \frac{10'}{200'}$ & $\frac{10'}{900'}$

say $S_{av} = \frac{10'}{500'} = 0.020$



Assumed flow section



Assume W.S. @ Elev. 932, then $A = (300)(3.0) + \left(\frac{300}{2}\right)(3) + \frac{(200)(1)}{2} + (225)(2) = 1900\ ft^2$

$WP = 300 + 300 + 200 + 50 = 850'$

$R = \frac{1900}{850} = 2.235$

$Q = (1900\ ft^2)\left(\frac{1.486}{0.025}\right)(2.235)^{\frac{2}{3}}(0.020)^{\frac{1}{2}} = 27{,}305$ cfs $V_{av} = 14.39$ fps

+ 720 cfs (10'x7' multi-plate arch - h=5')

28,025 cfs

Assume W.S. @ Elev. 934, then $A = 1900\ ft^2 + (850)(2') = 3600\ ft^2$

$WP = 850' + 4' = 854'$ $R = \frac{3600}{854} = 4.215$

$Q = (3600\ ft^2)\left(\frac{1.486}{0.025}\right)(4.215)^{\frac{2}{3}}(0.020)^{\frac{1}{2}} = 78{,}969$ cfs $V_{av} = 21.9$ fps

+ 852

79,821 cfs

Assume spillover into adjacent area will effectively double this flow to 160,000 cfs.

Between 10 & 15 houses will suffer shallow-depth high velocity flooding

CAMP DRESSER & McKEE
Environmental Engineers
Boston, Mass.

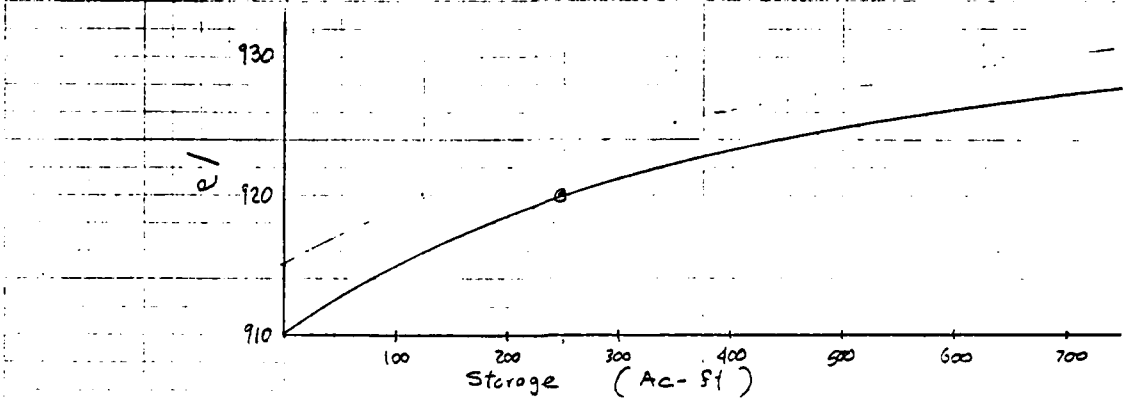
CLIENT COE
PROJECT
DETAIL Leahy (Upper) Res.

JOB NO. 380-5-5
DATE CHECKED 1-15-79
CHECKED BY

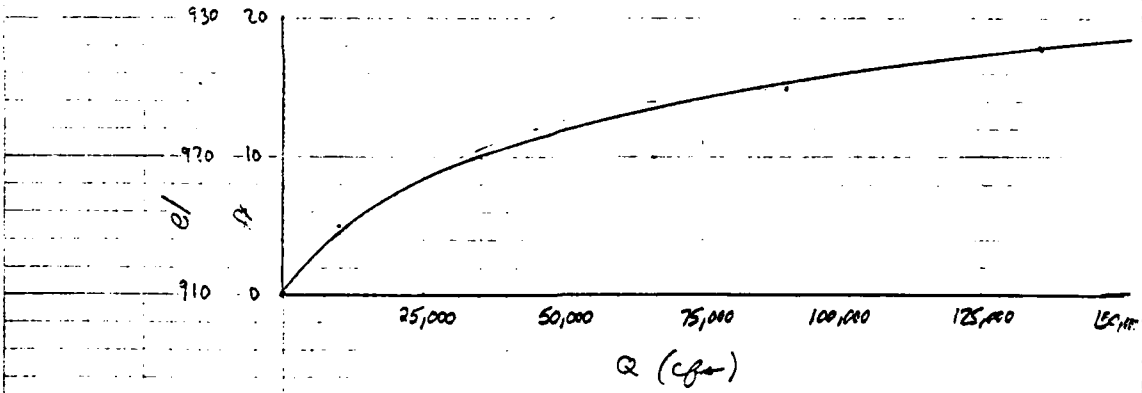
PAGE B-L 10
DATE 21 Sept 1978
COMPUTED BY JG

STORAGE AREA AVAILABLE AT CONFLUENCE OF HOUSATONIC RIVER

at el 910 (River el) surface area = 5.7 acres
at el 920 = 43
at el 930 = 83



Rating curve of river section @ Columbia St + factory building
Only compute rating from above normal river level (base flow)



$Q_{P_2\ Trial} = Q_{P_1}\left(1 - \frac{V_1}{S}\right) = 160{,}000\left(1 - \frac{400}{1050}\right)$

Trial Q_{P_2} = 63,000 V_2 = 400 ac-ft

$Q_{P_2\ Trial} = 99{,}050 \therefore V_2 = 575$ ac-ft

$\frac{V_1 + V_2}{2} = 487$

$Q_{P_2\ trial} = 160{,}000\left(1 - \frac{487}{1050}\right)$
$= 85{,}715 \therefore V_2 = 515$ ac-ft

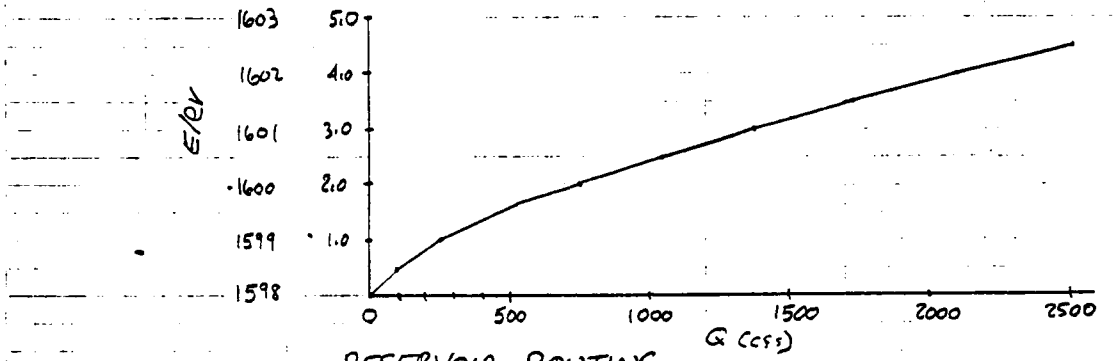
$\frac{V_1 + V_2}{2} = \frac{487 + 515}{2} = 501$ Ac-ft

$Q_{P_2} =$ 85,000 cfs @ el 925+

Spillway Rating

$Q = CLH^{3/2}$ $C = 3.0$ $L = 88$ Spillway crest el 1598

H	Q	H	Q	H	Q
.1	8	1.0	264	2.5	1043
.2	24	1.2	347	3.0	1371
.3	43	1.4	437	3.5	1728
.4	67	1.6	534	4.0	2112
.5	93	1.8	637	4.5	2520
.7	155	2.0	746		



RESERVOIR ROUTING

Surcharge Height to pass Q_{P_1} = 2000 cfs is H = 3.86
However weir is submerged, therefore H will be about 4.0'

Surface area at el 1598 = 47.1 acres (at spillway crest)
Surface area at el 1602 = 50 acres (at 4 ft above crest)

Volume of surcharge storage = $\left(\frac{50+47}{2}\right)(4) = 194$ ac-ft

D.A. = .682 mi² ≡ 436 acres
runoff = $\frac{194 \text{ ac-ft}}{436 \text{ acres}}$ = .4449 ft ≡ 53in = $STOR_1$

$Q_{P_2} = Q_{P_1}\left(1 - \frac{STOR_1}{19}\right) = 2000\left(1 - \frac{5}{19}\right) = 1470$ cfs

Surcharge height for Q_{P_2}, H = 3.14 or el 1601+ ; surface area = 49 acres

$\frac{\frac{47+49}{2}(3.14) \text{ ac-ft}}{436 \text{ acres}}(12 \text{ in/ft}) =$ 4 inches = $STOR_2$

Avg $STOR_1 + STOR_2 = 4.7$ inches

$Q_{P_3} = 2000\left(1 - \frac{4.7}{19}\right) = 1505$ cfs H = 3.2 el = 1601

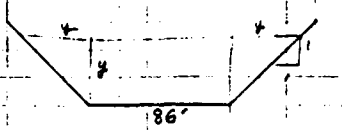
CAMP DRESSER & McKEE
Environmental Engineers
Boston, Mass.

CLIENT COE
PROJECT
DETAIL Leahy (Upper) Res.

JOB NO. 380-5.5
DATE CHECKED 4-13-82
CHECKED BY

PAGE 10 of 10
DATE 21 Sept 19XX
COMPUTED BY JW

TAILWATER ANALYSIS



d.s. channel slope = 1%
∴ Assume $S = .01$
$n = 0.03$

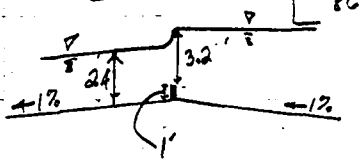
Find depth of flow @ $Q = 1505$ cfs

$A = 86y + y^2$
$WP = 86 + 2\sqrt{2y^2} = 86 + 2.83\sqrt{y^2}$
$R = \frac{86y + y^2}{86 + 2.83y}$

$Q = \frac{1.486}{n} A R^{2/3} S^{1/2}$

$AR^{2/3} = \frac{(1505)(.03)}{(1.486)(.01)^{1/2}} = 304$

Let $y = 2.4$ $\left[(86)(2.4) + (2.4)^2\right]\left[\frac{(86)(2.4) + (2.4)^2}{86 + 2.83(2.4)}\right]^{2/3} = 369$ OK



Weir: $L = 88'$ $C = 3.0$ $Q = 1505$
Find H over weir

$H^{3/2} = \frac{1505}{(3.0)(88)} = 5.7$

$H = 3.2$

Submerged weir (suppressed type)
$H_{upstream} = 3.2'$
$H_{downstream} = 1.4'$

From Water Measurement Manual by Dept of Interior, Bureau of Reclamation
Correct Q = H for submergence

$Q_1 = Q(1 - S^n)^{0.385}$ $S = \frac{d}{H} = \frac{1.4}{3.2} = .4375$ $n = 1.5$

$= (1505)(1 - .437^{1.5})^{.385}$
$= 1070$ ——— OK ∴ MPF flow will be contained in spillway channel

Note: Upstream & downstream head on weir will be slightly higher to pass Q = 1505 cfs due to submergence.

APPENDIX E
INFORMATION AS CONTAINED IN THE NATIONAL INVENTORY OF DAMS

INVENTORY OF DAMS IN THE UNITED STATES

STATE	IDENTITY NUMBER	DIVISION	STATE	COUNTY	CONGR. DIST.	STATE	COUNTY	CONGR. DIST.	NAME	LATITUDE (NORTH)	LONGITUDE (WEST)	REPORT DATE DAY MO YR
[illegible]	265	[illegible]	[illegible]	03	01				LEAHY (UPPER) RESERVOIR	4219.6	7312.9	

POPULAR NAME	NAME OF IMPOUNDMENT
	UPPER RESERVOIR

REGION	BASIN	RIVER OR STREAM	NEAREST DOWNSTREAM CITY-TOWN-VILLAGE	DIST FROM DAM (MI.)	POPULATION
[illegible]	7	[illegible]	LEE	2	6400

TYPE OF DAM	YEAR COMPLETED	PURPOSES	STRUCTURAL HEIGHT (FT.)	HYDRAULIC HEIGHT (FT.)	IMPOUNDING CAPACITIES MAXIMUM (ACRE-FT.)	NORMAL (ACRE-FT.)	DIST	OWN	FED R	PRV/FED	SCS A	VER/DATE
[illegible]	1964	S	67	56	1160	880	[illegible]	N	N	N	N	07MAR79

REMARKS

D/S HAS	SPILLWAY CREST LENGTH	TYPE	WIDTH (FT.)	MAXIMUM DISCHARGE (FT.)	VOLUME OF DAM (CY)	POWER CAPACITY INSTALLED (MW)	PROPOSED (MW)	NO	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)
[illegible]	610	1	35	5420												

OWNER	ENGINEERING BY	CONSTRUCTION BY
[illegible] LEE	TIGH AND BOND	PETRICCA CONST. CO.

REGULATORY AGENCY

DESIGN	CONSTRUCTION	OPERATION	MAINTENANCE
[illegible]	NONE	NONE	NONE

INSPECTION BY	INSPECTION DATE DAY MO YR	AUTHORITY FOR INSPECTION
CAMP DRESSER AND MCKEE INC.	07SEP78	PL 92-367

REMARKS

END

FILMED

7-85

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